

D-33-7-7-13

**DRAFT INTERIM
RCRA FACILITY ASSESSMENT**

**TOOELE ARMY DEPOT, NORTH AREA
TOOELE COUNTY, UTAH**

PREPARED FOR

**U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF SOLID WASTE
WASHINGTON, D.C.**

**EPA CONTRACT NO. 68-01-7310
WORK ASSIGNMENT NO. 03**

NUS PROJECT NUMBER Y949

AUGUST 1987

SUBMITTED FOR NUS BY:


**RICHARD M. NINESTEEL, P.E.
PROJECT MANAGER**

TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	Purpose of Investigation	1-1
1.2	Scope of Work	1-1
2.0	BACKGROUND	2-1
2.1	Facility Description and Waste Generation	2-1
2.1.1	Location	2-1
2.1.2	Site Layout	2-1
2.1.3	Facility Description	2-1
2.1.4	Onsite Treatment Facilities	2-1
2.2	Wastes Generated	2-4
2.3	Environmental Setting	2-4
2.3.1	Physiographic Setting	2-4
2.3.2	Geology	2-12
2.3.3	Hydrogeology	2-13
2.3.4	Surface Water Hydrology	2-15
2.3.5	Climate	2-15
3.0	LOCATION OF SOLID WASTE MANAGEMENT UNITS	3-1
4.0	SOLID WASTE MANAGEMENT UNIT RELEASE INFORMATION	4-1
4.1	Unit No. 1: Demolition Grounds	4-1
4.1.1	Description	4-1
4.1.2	Waste Characteristics	4-1
4.1.3	Migration Pathways and Evidence of Release	4-1
4.2	Unit No. 2: Industrial Wastewater Lagoons and Outfall Area	4-2
4.2.1	Description	4-2
4.2.2	Waste Characteristics	4-3
4.2.3	Migration Pathways and Evidence of Release	4-4
4.3	Unit No. 3: L-23 Pond	4-5
4.3.1	Description	4-5
4.3.2	Waste Characteristics	4-5
4.3.3	Migration Pathways and Evidence of Release	4-11
4.4	Unit No. 4: Sandblast Area	4-11
4.4.1	Description	4-11
4.4.2	Waste Generated	4-12
4.4.3	Migration Pathways and Evidence of Release	4-12
4.5	Unit No. 5: K-281 PCB Spill	4-12
4.5.1	Description	4-12
4.5.2	Waste Characteristics	4-13
4.5.3	Migration Pathways and Evidence of Release	4-13
4.6	Unit No. 6: Surveillance Test Range	4-14
4.6.1	Description	4-14
4.6.2	Waste Characteristics	4-14
4.6.3	Migration Pathways and Evidence of Release	4-14
4.7	Unit No. 7: Chemical Range	4-15
4.7.1	Description	4-15
4.7.2	Waste Characteristics	4-15
4.7.3	Migration Pathways and Evidence of Release	4-15

TABLE OF CONTENTS (CONTINUED)

4.8	Unit No. 8: Firing Ranges	4-16
4.8.1	Description	4-16
4.8.2	Waste Characteristics	4-16
4.8.3	Migration Pathways and Evidence of Release	4-17
4.9	Unit No. 9: Radioactive Waste Storage Area	4-17
4.9.1	Description	4-17
4.9.2	Waste Characteristics	4-18
4.9.3	Migration Pathways and Evidence of Release	4-18
4.10	Unit No. 10: Bomb Washout Facility	4-19
4.10.1	Description	4-19
4.10.2	Waste Characteristics	4-19
4.10.3	Migration Pathways and Evidence of Release	4-19
4.11	Unit No. 11: Laundry Effluent Pond	4-20
4.11.1	Description	4-20
4.11.2	Waste Characteristics	4-20
4.11.3	Migration Pathways and Evidence of Release	4-21
4.12	Unit No. 12: Pesticide Storage Facility (Building 518)	4-21
4.12.1	Description	4-21
4.12.2	Waste Characteristics	4-22
4.12.3	Migration Pathways and Evidence of Release	4-22
4.13	Unit No. 13: Hazardous Waste Storage Tanks	4-23
4.13.1	Description	4-23
4.13.2	Waste Characteristics	4-23
4.13.3	Migration Pathways and Evidence of Release	4-23
4.14	Unit No. 14: Sewage Lagoons	4-24
4.14.1	Description	4-24
4.14.2	Waste Characteristics	4-24
4.14.3	Migration Pathways and Evidence of Release	4-24
4.15	Unit No. 15: Sanitary Landfill	4-25
4.15.1	Description	4-25
4.15.2	Waste Characteristics	4-25
4.15.3	Migration Pathways and Evidence of Release	4-26
4.16	Unit No. 16: Septic Tanks	4-26
4.16.1	Description	4-26
4.16.2	Waste Characteristics	4-27
4.16.3	Migration Pathways and Evidence of Release	4-27
4.17	Unit No. 17: Maintenance/Storage Area	4-28
4.17.1	Description	4-28
4.17.2	Waste Characteristics	4-28
4.17.3	Migration Pathways and Evidence of Release	4-28
4.18	Unit No. 18: Radioactive Waste Storage (Building S-659)	4-29
4.18.1	Description	4-29
4.18.2	Waste Characteristics	4-29
4.18.3	Migration Pathways and Evidence of Release	4-29
4.19	Unit No. 19: AEO Demilitarization Facility	4-30
4.19.1	Description	4-30
4.19.2	Waste Characteristics	4-30
4.19.3	Migration Pathways and Evidence of Release	4-30

TABLE OF CONTENTS (CONTINUED)

4.20	Unit No. 20: AEO Deactivation Furnace Site	4-31
4.20.1	Description	4-31
4.20.2	Waste Characteristics	4-31
4.20.3	Migration Pathways and Evidence of Release	4-32
4.21	Unit No. 21: Deactivation Furnace, Building 1320	4-32
4.21.1	Description	4-32
4.21.2	Waste Characteristics	4-33
4.21.3	Migration Pathways and Evidence of Release	4-33
4.22	Unit No. 22: Building 1303 and Leaching Pond	4-34
4.22.1	Description	4-34
4.22.2	Waste Characteristics	4-34
4.22.3	Migration Pathways and Evidence of Release	4-34
4.23	Unit No. 23: Bomb and Shell Reconditioning Building	4-35
4.23.1	Description	4-35
4.23.2	Waste Characteristics	4-35
4.23.3	Migration Pathways and Evidence of Release	4-35
4.24	Unit No. 24: Tire Disposal Site	4-35
4.24.1	Description	4-35
4.24.2	Waste Characteristics	4-35
4.24.3	Migration Pathways and Evidence of Release	4-36
4.25	Unit No. 25: Battery Pit	4-36
4.25.1	Description	4-36
4.25.2	Waste Characteristics	4-36
4.25.3	Migration Pathways and Evidence of Release	4-37
4.26	Unit No. 26: Battery Shop	4-37
4.26.1	Description	4-37
4.26.2	Waste Characteristics	4-38
4.26.3	Migration Pathways and Evidence of Release	4-38
4.27	Unit No. 27: DPDO Storage Yards	4-38
4.27.1	Description	4-38
4.27.2	Waste Characteristics	4-39
4.27.3	Migration Pathways and Evidence of Release	4-39
4.28	Unit No. 28: Permanent Drum Storage Area	4-39
4.28.1	Description	4-39
4.28.2	Waste Characteristics	4-40
4.28.3	Migration Pathways and Evidence of Release	4-40
4.29	Unit No. 29: 90-Day Drum Storage Area	4-41
4.29.1	Description	4-41
4.29.2	Waste Characteristics	4-41
4.29.3	Migration Pathways and Evidence of Release	4-41
4.30	Summary	4-42
5.0	CONCLUSIONS AND RECOMMENDATIONS	5-1
5.1	Summary of Release Information	5-1
5.2	Recommendations	5-1
5.2.1	Unit No. 1: Demolition Grounds	5-1
5.2.2	Unit No. 2: Industrial Wastewater Lagoon and Outfall Area	5-2
5.2.3	Unit No. 3: L-23 Pond	5-2
5.2.4	Unit No. 4: Sandblast Area	5-2

TABLE OF CONTENTS (CONTINUED)

5.2.5	Unit No. 5: K-281 PCB Spill	5-2
5.2.6	Unit No. 6: Surveillance Test Range	5-2
5.2.7	Unit No. 7: Chemical Range	5-2
5.2.8	Unit No. 8: Firing Ranges	5-2
5.2.9	Unit No. 9: Radioactive Waste Storage Area	5-3
5.2.10	Unit No. 10: Bomb Washout Facility	5-3
5.2.11	Unit No. 11: Laundry Effluent Ponds	5-3
5.2.12	Unit No. 12: Pesticide Storage Facility (Building 518)	5-3
5.2.13	Unit No. 13: Hazardous Wastewater Storage Tanks	5-3
5.2.14	Unit No. 14: Sewage Lagoons	5-4
5.2.15	Unit No. 15: Sanitary Landfill	5-4
5.2.16	Unit No. 16: Septic Tanks	5-4
5.2.17	Unit No. 17: Maintenance/Storage Area	5-4
5.2.18	Unit No. 18: Radioactive Waste Storage (Building S-659)	5-4
5.2.19	Unit No. 19: AEO Demilitarization Facility	5-4
5.2.20	Unit No. 20: AEO Deactivation Furnace Site	5-5
5.2.21	Unit No. 21: Deactivation Furnace Building 1320	5-5
5.2.22	Unit No. 22: Building 1303	5-5
5.2.23	Unit No. 23: Bomb and Shell Reconditioning Building	5-5
5.2.24	Unit No. 24: Tire Disposal Site	5-5
5.2.25	Unit No. 25: Battery Pit	5-6
5.2.26	Unit No. 26: Battery Shop	5-6
5.2.27	Unit No. 27: DPDO Storage Yards	5-6
5.2.28	Unit No. 28: Permanent Drum Storage Area	5-6
5.2.29	Unit No. 29: 90-Day Drum Storage Area	5-6
REFERENCES		R-1

TABLES

<u>NUMBER</u>		<u>PAGE</u>
2-1	Historical Summary of Industrial Activities at TEAD North	2-5
2-2	Typical Explosives and Propellants demilitarized at Tooele Army Depot	2-8
3-1	Solid Waste Management Units - TEAD North	3-2
4-1	Chemical Analyses of IWL Liquid Waste	4-5
4-2	Chemical Analyses of IWL Liquid Waste Detected in IWL Wastewater Samples	4-7
4-3	Concentrations of Priority Pollutants Detected in IWL Sludge Samples	4-8

FIGURES

<u>NUMBER</u>		<u>PAGE</u>
2-1	General Location	2-2
2-2	Installation Layout	2-3
3-1	SWMU Locations	3-2

1.0 INTRODUCTION

1.1 PURPOSE OF INVESTIGATION

The RCRA Facility Assessment (RFA) is designed to evaluate releases of hazardous waste or hazardous constituents and to identify corrective actions, as necessary, under the Hazardous and Solid Waste Amendments of 1984. The RFA provides information on solid waste management units (SWMUs) at RCRA facilities, evaluates the potential for releases to the environment, and determines the need for further investigation.

This investigation, unlike typical RFAs, did not include a visual site inspection. This RFA was a desk-top exercise to review existing EPA files and gather data from appropriate state environmental agencies regarding Solid Waste Management Units (SWMUs) at the Tooele Army Depot, North Area. In addition, a letter was sent to the facility requesting detailed information associated with data gaps for each SWMU. The information gathered was also used to evaluate the individual SWMUs for potential contaminant releases.

1.2 SCOPE OF WORK

The scope of work performed in this investigation includes the following elements:

- Review and compilation of existing information obtained from the United States Environmental Protection Agency's (EPA) Region VIII files located in Denver, Colorado.
- Review and compilation of existing information obtained from the Utah State Division of Environmental Health files located in the Salt Lake City, Utah, office.

A listing of all documents reviewed during this assessment is provided in the reference section.

2.0 BACKGROUND

2.1 FACILITY DESCRIPTION AND WASTE GENERATION

2.1.1 Location

Tooele Army Depot, North Area (TEAD North) is located in northern Utah in the Tooele Valley, approximately 35 miles southwest of Salt Lake City, Utah, and immediately west of the City of Tooele, Utah (1980 population 14,335). The City of Grantsville (1980 population 4,419) is located 2 miles north of the northwestern corner of the depot. The installation occupies 24,732 acres of land (IPEC, 1984). Figure 2-1 illustrates the general location of the installation.

2.1.2 Site Layout

Industrial operations at TEAD North are concentrated in the eastern part of the depot. Ammunition storage igloos are spaced throughout the central depot area, and munitions demolition/deactivation/testing operations are concentrated in the southwestern part of the depot. Figure 2-2 illustrates the installation layout.

2.1.3 Facility Description

Tooele Army Depot was established in 1942 for the storage of World War II supplies, munitions, and vehicles. Over the years, the depot has steadily grown as it absorbed responsibilities of other army facilities. The depot is one of the major ammunition storage and equipment maintenance installations in the United States. TEAD currently employs approximately 4,000 people, primarily civilians, and is the major employer in Tooele Valley (IPEC, 1984).

The primary mission of TEAD North consists of the care, maintenance, renovation, storage, and demilitarization of ammunition and combat vehicles. TEAD North has also performed guided missile and tube repair, retreading of tires, and locomotive maintenance.

2.1.4 Onsite Treatment Facilities

The facilities at TEAD North which have been utilized for waste management include landfills, detonation/burn areas, demilitarization facilities, ponds, lagoons, storage areas, and drainfields

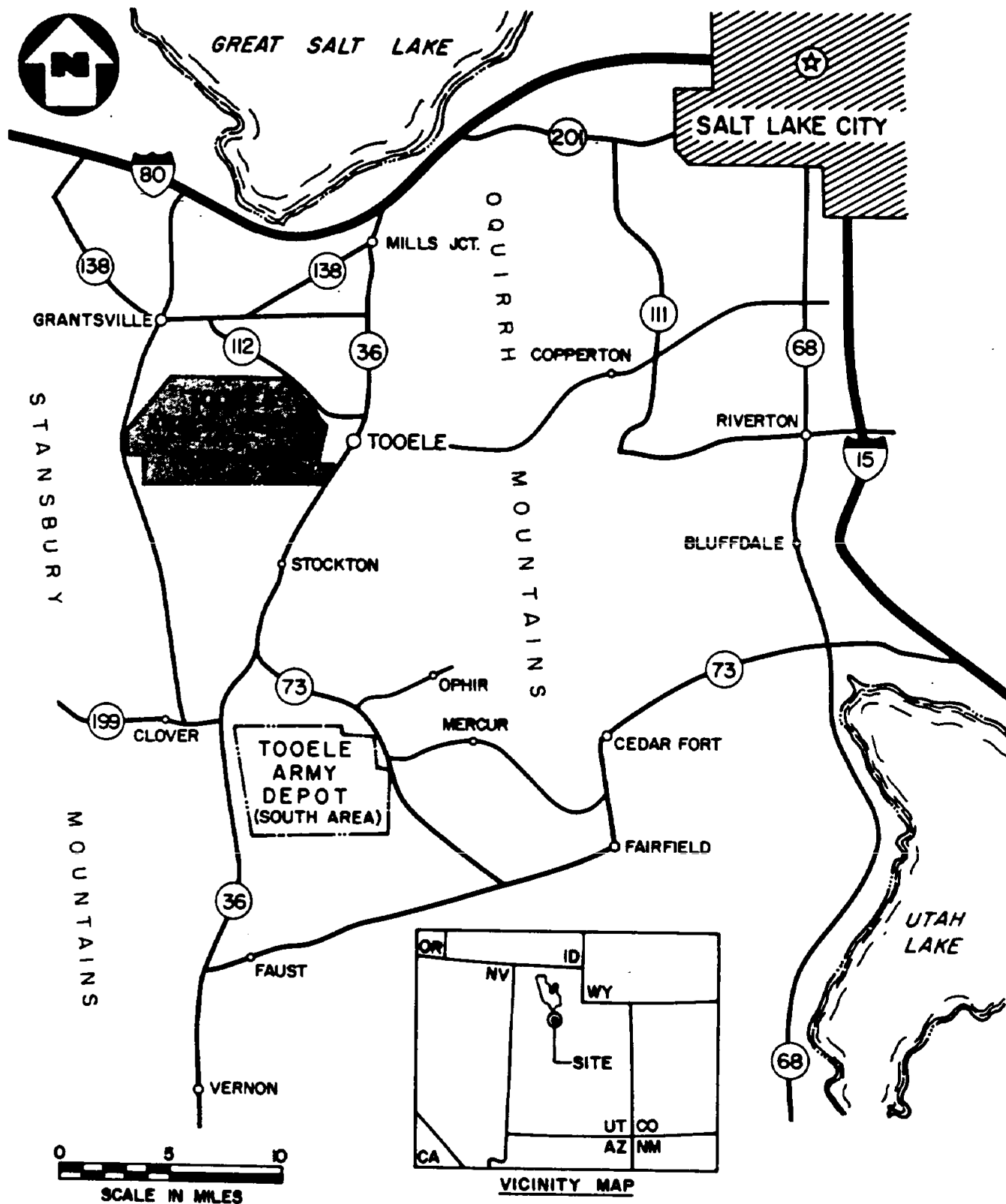


FIGURE 2-1



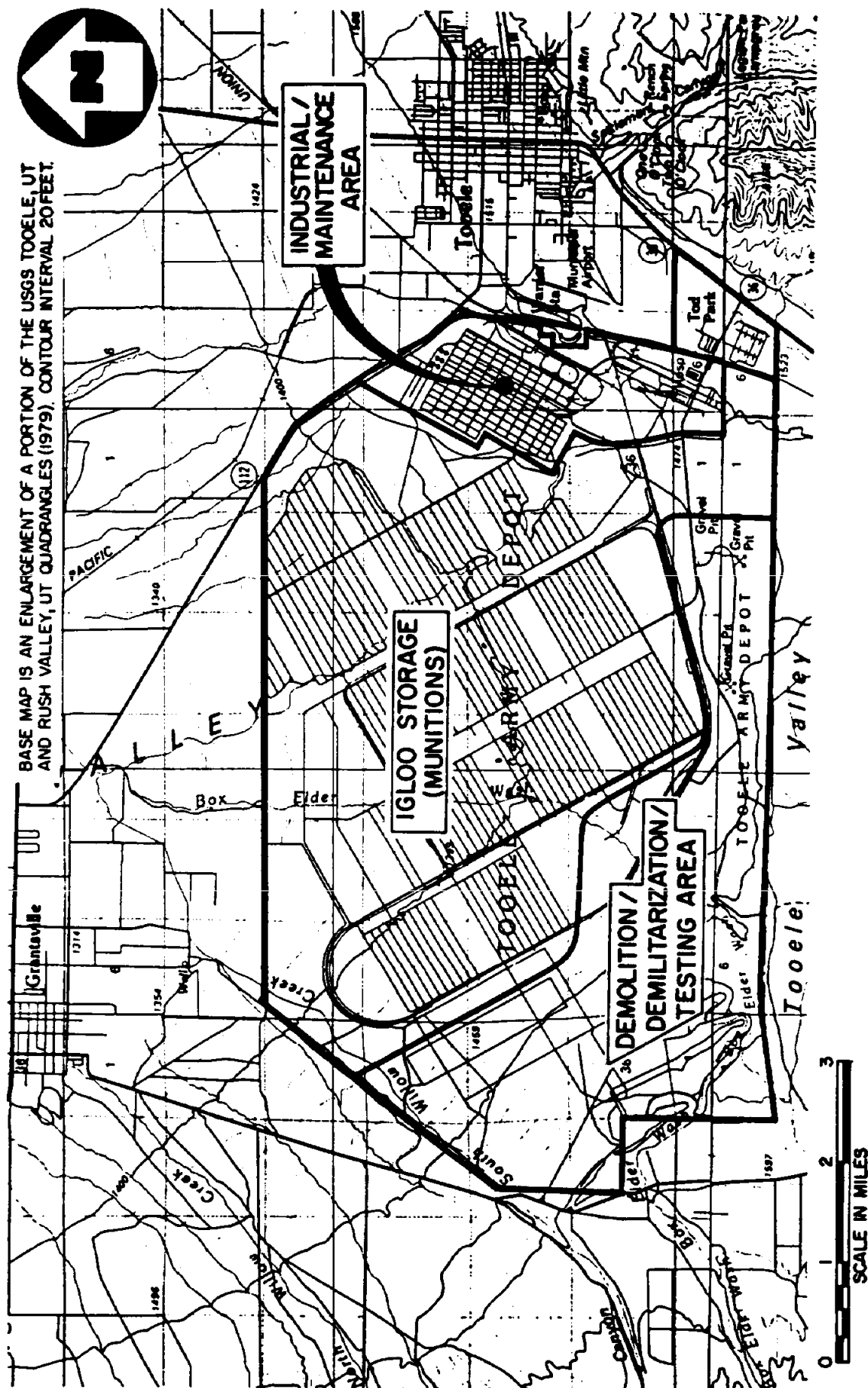


FIGURE 2-2



(Ertec, 1982, and USATHAMA, 1979). These areas have accepted both hazardous and nonhazardous wastes.

The majority of the waste disposal areas are regulated under RCRA and State of Utah hazardous waste regulations. To better define RCRA- and CERCLA-regulated waste managements units, an onsite inspection was conducted on January 14, 1985, by EPA Region VIII, TEAD, State of Utah, and Camp Dresser & McKee, Inc. personnel. The conclusions of the inspection were that the Bomb Washout Facility (SWMU No. 10) was a CERCLA-regulated waste disposal unit, and all other areas were RCRA-regulated units.

2.2 Wastes Generated

The wastes generated at TEAD North are the result of three broad categories of activities. These three categories are as follows:

- Industrial operations associated with the repair, overhaul, modification, and conversion of combat equipment.
- Ammunition inspection, renovation, maintenance, and demilitarization activities.
- Daily living activities.

The industrial area of TEAD North has generated waste waters containing chrome and cadmium (from metal finishing operations), detergents, solvents (from degreasing operations), oils and grease (from steam cleaning and vehicle wash facilities), acids and caustic (from metal cleaning operations), and boiler blowdown.

A historical listing of the industrial operations and potential contaminants generated by the industrial operations are listed in Table 2-1. This table also lists the building and activity generating the waste. Table 2-2 lists waste materials common to ammunition inspection, renovation, maintenance, and demilitarization operations that could potentially be found at TEAD North.

2.3 ENVIRONMENTAL SETTING

2.3.1 Physiographic Setting

TEAD North is located in the Tooele Valley. The area surrounding the depot exhibits typical Basin and Range physiography, with fault block mountain ranges, primarily trending north-south, separated by wide, nearly level valleys. Tooele Valley is bordered to the east by the Oquirrh

TABLE 2-1

HISTORICAL SUMMARY OF INDUSTRIAL ACTIVITIES AT TEAD NORTH

Building No.	Activity	Potential Contaminant
8	Filling fire extinguishers	Sulfuric acid
10	Maintenance and repair of electronic equipment	Petroleum products
TL-23	Spray painting	Paint pigments
T-31	Removing base plates from bombs	Explosive dusts
S-33	Metal stripping, cleaning, anodizing and electroplating, spray painting	Chromic acid, phosphoric acid, hydrochloric acid, paint pigments
T-37	Laundering clothes	Explosives residue
T-45	Washing out bombs, pelletizing explosives	TNT, RDX, Composition B
51	Unpacking and repacking rockets; demilitarizing 120mm cartridges, inserting boosters, disassembling hand grenades	Greases and oil, double base propellant, black powder, nitroglycerin, Pettman cement, TNT
52	Filling and recharging Edison batteries Lead burning on battery terminals	Sodium hydroxide Lead dust
T-118	Vehicle maintenance, welding	Petroleum products, metal dust
119	Repair and maintenance of vehicles	Petroleum products
501	Mixing and dispensing insecticides	Lindane, chlordane, malathion, and DDT
507	Filling and changing lead-acid batteries	Sulfuric acid
510	Vehicle maintenance and repair; welding	Petroleum products, cresolic acid, metal dust
511	Vapor-degreasing, welding	Trichloroethylene, trichloroethane, metal dust
513	Spray painting	Paint pigments
518	Mixing and dispensing pesticides	Pesticides
520	Spray painting, linking and packing 50 cal. ammunition, pulling apart small arms ammunition, demilitarizing small arms ammunition, popping primers	Paint pigments, greases and oils, propellant, tracer and incendiary powder, lead dust
532	Mixing and dispensing pesticides	Pesticides including dieldrin, diazinon, warfarin, malathion, DDT, and chlordane
533	Spray paint, cleaning metals, welding	Paint pigments, phosphoric acid, metal dust

TABLE 2-1
HISTORICAL SUMMARY OF INDUSTRIAL ACTIVITIES
AT TEAD NORTH
PAGE TWO

Building No.	Activity	Potential Contaminant
539	Burning tracers from butts, lead recovery from tips and butts, burning of fuses, primers and small arms ammunition	Antimony, lead dust
553	Packing and cleaning CN hand grenades including paint containers; paint stripping parts	CN, greases, oil, paint pigments, caustic, phosphoric acid
600 (North Area)	Spray painting, missile disassembly	Paint pigments, petroleum products
	Metal stripping, cleaning, anodizing and electroplating	Phenols, cresols, phosphoric acid, chromic acid, sodium hydroxide, fluorides, nitric acid, plating wastes
	Vapor-degreasing	Trichloroethylene, trichloroethane
602	Vehicle parts lubrication and preservation	Petroleum products
603	Tire repair and recapping	Rubber dusts, vulcanizing cement
604	Spray painting, vapor-degreasing; welding	Paint pigment; trichloroethylene; metal dust
607	Welding	Metal dust
608	Machining metals, welding	Oils, coolants and greases, metal dust
609	Metal stripping, cleaning, anodizing and electroplating	Caustic, hydrochloric acid, phosphoric acid, plating wastes
	Radiator repair, including brazing	Metal dust
611	Vapor degreasing, cleaning and lubricating parts	Trichloroethylene Petroleum products
612	Spray painting	Paint pigments
	Sanding of painted surfaces	Paint and metal dusts
613	Welding	Metal dust
614	Etching and rinsing plates	Trichloroethylene
615	Metal stripping, cleaning, anodizing and electroplating	Zinc compounds, phosphoric acid, sodium hydroxide, phenols, creosols, chromic acid, nitric acid, fluorides, oil, plating wastes
	Vapor degreasing	Trichloroethylene, trichloroethane
	Spray painting	Paint pigments

TABLE 2-1
HISTORICAL SUMMARY OF INDUSTRIAL ACTIVITIES
AT TEAD NORTH
PAGE THREE

Building No.	Activity	Potential Contaminant
619	Vehicular rebuilding, tuning and testing; welding; vapor degreasing; cleaning gunbores; machining and grinding; filling in dents	Metal fumes; trichloroethylene; petroleum products; stoddard solvent; metal dusts; benzoyl peroxide; phthalate esters
	Spray painting	Paint pigments
620	Metal stripping, cleaning, anodizing, and electroplating	Alkali, phosphoric acid, chromic acid
	Vapor degreasing	Trichloroethylene, trichloroethene
637	Arc, acetylene and inserting-gas welding; machining and grinding; assembling transmissions; small arms repair	Metal dusts
	Metal stripping, cleaning, anodizing and electroplating	Cresylic acid, sodium hydroxide, chromic acid, plating wastes
	Vapor degreasing	Trichloroethylene, trichloroethane
	Spray painting; axle rebuilding	Paint pigments; petroleum products
644	Acetylene cutting	Metal dust
647	Foam-in-place packaging, woodworking	Toluene diisocyanate

Source: USATHAMA, 1979

TABLE 2-2
TYPICAL EXPLOSIVES AND PROPELLANTS DEMILITARIZED
AT TOOELE ARMY DEPOT

Propellant/ Explosive	Chemical Formula	Composition		Uses
RDX	$C_3H_6N_6O_6$	C-16.3% H-2.7 N-37.8 O-43.2		Detonating Cord, Primers, Component of Mixed Explosives, Detonators, Booster for Anti-tank Mines, Burster in Small Caliber ammo.
TNT	$C_7H_5N_3O_6$	C-37.0% H-2.2 N-18.5 O-42.3		Component of Other Explosives, Demolition Blocks, Burstors, Mines, Primers.
Tritonal	See TNT	Aluminum 20% TNT 80 Aluminum 30% TNT 70 Aluminum 40% TNT 60		Mines, Torpedo Warheads, Depth Charges, Bombs.
PETN	$C_5H_8N_4O_{12}$	C-19.0% H-2.5 N-17.7 O-60.8		See RDX
<u>Pentolite Series</u>				
50/50	See TNT & PETN	TNT 50.0% PETN 50.0		Shaped Charges, Bursting Charges in Bombs and Projectiles.
10/90	See TNT & PETN	PETN 10.0% TNT 90.0		
Nitrostarch	Nitrated Starch	Nitrostarch 49.0% Barium Nitrate 40.0 Mononitronaphthalene 7.0 para-Nitroaniline 3.0 Oil 1.0		Projectiles, Bombs, Depth Charges, Small Caliber Ammo, Spotting charge.

TABLE 2-2
TYPICAL EXPLOSIVES AND PROPELLANTS DEMILITARIZED
AT TOOELE ARMY DEPOT
PAGE TWO

Propellant/ Explosive	Chemical Formula	Composition		Uses
Minol - 2	NH ₄ NO ₃ TNT Aluminum	Ammonium Nitrate TNT Aluminum	40.0% 40.0 20.0	See Nitrostarch
HBX - 1	See RDX, TNT, & Aluminum	RDX TNT Aluminum Desensitizer (Comp D2)	40.0% 38.0 17.0 5.0	Boosters, Depth Charges, Torpedos, Rockets, Mines, Bombs.
HBX - 3	See HBX - 1	RDX TNT Aluminum Comp. D2	31.0% 29.0 35.0 5.0	See HBX - 1
Explosive D	C ₆ H ₆ N ₄ O ₇	C-29.3% H-2.4 N-22.7 O-45.6		Bombs, Projectiles, Grenades, Depth Charges.
<u>Dynamites</u>				
Medium Velocity	See RDX & TNT	RDX TNT Starch Oil Polyisobutylene	75.0% 15.0 5.0 4.0 1.0	Excavation, Demolition, Cratering.
Low Velocity	See RDX & TNT	RDX TNT Tripentaerythritol Binder Cellulose Acetate	17.5% 67.8 8.6 4.1 2.0	
Cyclotol	See RDX & TNT	RDX TNT RDX TNT RDX TNT RDX TNT	60.0% 40.0 65.0% 35.0 70.0% 30.0 75.0% 25.0	See Explosive D

TABLE 2-2
TYPICAL EXPLOSIVES AND PROPELLANTS DEMILITARIZED
AT TOOLEE ARMY DEPOT
PAGE THREE

Propellant/ Explosive	Chemical Formula	Composition	Uses
<u>Comp. B. Series</u>			
Comp. B	See RDX & TNT	RDX 60.0% TNT 39.0 WAX 1.0	Projectiles, Mines, Rockets, Grenades, Bombs.
Comp. B 2	See Above	RDX 60.0% TNT 40.0	Same as Above
Comp. B 3	See Above	RDX 59.5% TNT 40.5	Same as Above
Comp. B 4	See Above	RDX 60.0% TNT 39.5 Calcium Silicate .5	Same as Above
<u>Comp. C. Series</u>			
Comp. C	See RDX	RDX 88.3% Plastisizer 11.7 (non Explosive)	Demolition Explosive
Comp C 2	See RDX	RDX 78.7% Plastisizer 21.3	Demolition Explosive
Comp C 3	See RDX	RDX 77.0% Plastisizer 23.0	Demolition Explosive
Comp C4	See RDX	RDX 91.0% Polyisobutylene 2.1 Oil 1.6 Di(2 EthylHexyl)Sebacate 5.3	Demolition Explosive
<u>Black Powder</u>			
Classes 1-7 & 9		Potassium Nitrate 74.0% ± 1.0% Sulfur 10.4 ± 1.0 Charcoal 15.6 ± 1.0	Igniters, Primers, Propellants, Pyrotechnics.
Class 8		Potassium Nitrate 74.0% ± 1.0-2.0% Sulfur 10.4 ± 1.5-1.0 Charcoal 15.6 ± 1.5-1.0	Detonators, Hand Grenades, Signal Rockets, Depth Charges, Torpedos.

TABLE 2-2
TYPICAL EXPLOSIVES AND PROPELLANTS DEMILITARIZED
AT TOOELE ARMY DEPOT
PAGE FOUR

Propellant/ Explosive	Chemical Formula	Composition	Uses
<u>Amatol Series</u>			
50/50	See TNT	<div>NH₄NO₃ 50%</div> <div>TNT 50</div>	Bombs, Projectiles, Cratering Charge, Bangalore Torpedos.
60/40	See TNT	<div>NH₄NO₃ 60%</div> <div>TNT 40</div>	
80/20	See TNT	NH ₄ NO ₃ 80%	
		TNT 20	

Mountains, to the west by the Stansbury Mountains, and South Mountain is located at the southern end of the valley. The northern end of Tooele Valley opens up into the Great Salt Lake.

TEAD North is situated midway between the mountain ranges forming the eastern and western borders of the valley. There is a gentle overall northerly slope of the land surface across the depot, with little relief. In the eastern portion of the depot, there is an overall land slope to the northwest, while in the western area of the depot, the land surface slopes to the northeast (see Figure 2-2).

2.3.2 Geology

TEAD North is underlain by unconsolidated deposits of Tertiary and Quaternary age, which in turn overlie Paleozoic bedrock. The bedrock is composed of sedimentary rock units, which are exposed in the mountain ranges bordering Tooele Valley. Bedrock in the area has been extensively folded and faulted (JMM, 1987).

The unconsolidated sediments that overlie bedrock throughout Tooele Valley consist of Quaternary age alluvium, colluvium, and lacustrine deposits and Tertiary age sediments belonging to the Salt Lake Group. The Quaternary deposits form the surficial geologic unit across the area of the depot, except where bedrock outcrops at ground surface.

Across the eastern part of the depot, the surficial deposits are primarily alluvial in character. These deposits are typical alluvial fan deposits, consisting of discontinuous lenses of poorly sorted sediments ranging in size from clay to cobbles. For the most part, the sediments are primarily granular to rocky, and have been transported from the Oquirrh Mountains east of the depot (JMM, 1987).

In the western part of the depot, the surficial deposits are primarily lake bed deposits from Lake Bonneville, a Pleistocene age lake. These deposits are somewhat finer grained in nature than the alluvial deposits, however, coarse-grained lake deposits are found in some areas, representing ancient terraces, bars, spits, and beaches (USATHAMA, 1979).

Tertiary age deposits that underlie the surficial Quaternary age deposits belong to the Salt Lake Group, and consist of sand, gravel, silt, clay, and volcanic ash. The Tertiary deposits are similar in nature to the overlying younger deposits, with the presence of volcanic ash in significant amounts the primary distinguishing factor in identifying and dating the sediments. In addition to the presence of volcanic ash, the Tertiary sediments are somewhat more consolidated than the overlying deposits, although this change is a gradual one. The combined thickness of the unconsolidated

deposits across the depot is expected to range from 0 feet, at bedrock outcrops, to over 1,000 feet, in the northern part of the depot (JMM, 1987).

Bedrock underlying the unconsolidated sediments in Tooele Valley primarily consists of alternating beds of limestone and quartzite, and is similar to the exposed bedrock in the neighboring mountain ranges. Bedrock units examined at an outcrop in the eastern portion of the base were described as limestone, dolomite, sandstone, and quartzite, and were tentatively identified as belonging to the Pennsylvanian age Butterfield Peaks Formation. The overall strike of the bedding of the individual units is to the northeast, with a 30° to 60° dip to the northwest. Fractures observed in local outcrops have predominant northwest orientations (perpendicular to strike) and high angle dips to both the northeast and southwest (JMM, 1987).

Extensive folding and faulting of the bedrock has occurred throughout the area. Numerous faults exist within Tooele Valley, as the valley is a structural feature related to block faulting. Faults have been tentatively identified but not confirmed within the confines of the base, based on gravity and borehole data. The nearest identified potentially active faults are the Oquirrh marginal fault, located east of the Town of Tooele, and the Six Mile Creek fault, located north of TEAD North. Both faults are located approximately 5 miles from the depot (JMM, 1987).

2.3.3 Hydrogeology

Groundwater at TEAD North is found in both the alluvium and in the underlying bedrock. The alluvial deposits are utilized as a source of water supply for the depot. The groundwater flow systems identified are hydraulically connected to varying degrees. Groundwater in the alluvial deposits primarily occurs under unconfined conditions, while the bedrock flow system is reportedly under confined conditions.

The alluvial deposits in Tooele Valley contain large supplies of readily available groundwater. The permanent water table within the alluvial deposits is located over 300 feet below land surface, based on data available from production wells installed at the base. Groundwater levels in the vicinity of the Industrial Waste Lagoon are reported to be approximately 200 feet below land surface (JMM, 1987). A thin, low-yielding, perched layer of groundwater was also found 18 to 20 feet below land surface, during well drilling operations (USATHAMA, 1979). The areal extent of this perched layer is unknown, and it is likely that other perched lenses of groundwater occur overlying fine-grained lenses within the unconsolidated deposits. Hydraulic conductivity tests were performed in the unconsolidated deposits in a number of test borings at the depot. The resulting hydraulic conductivity values ranged from 1 gallon per day per square foot (gpd/ft²) to greater than

1,000 gpd/ft², with typical values greater than 500 gpd/ft². The wide range of values reported was expected, given the nature of the deposits (alluvial fan deposits). Groundwater flow velocities in the unconsolidated deposits were calculated to range from less than 1 to 9,800 feet per year (ft/yr) (JMM, 1987).

Groundwater flow within the bedrock units underlying TEAD North is controlled by fractures, with fracture frequency and width controlling the water-yielding and flow characteristics of the bedrock flow system. Limited data is available concerning groundwater within the bedrock, and what data there is is concentrated around the industrial waste lagoon. In-situ hydraulic conductivity tests performed in bedrock wells yielded values ranging from less than 1 to over 200 gpd/ft². Flow velocities within the bedrock units vary widely, and overall are slightly lower than in the overlying alluvium (JMM, 1987).

The overall groundwater flow direction in Tooele Valley is to the north, toward Great Salt Lake. Groundwater flows to the northwest across the eastern portion of the depot, and is expected to flow north or slightly northeast across the western portion of the depot, following the overall slope of the land surface (USATHAMA, 1979).

Recharge to the groundwater flow systems underlying TEAD North is primarily from precipitation infiltration through high permeability gravelly soils located along valley margins and from surface water infiltration through alluvial fans where canyon streams empty out into Tooele Valley. Minor sources of recharge include subsurface flow into the valley from neighboring areas and precipitation infiltration across the low-lying areas of the valley. A downward gradient was noted in the groundwater flow systems studied at the depot, which is indicative of a recharge area. This downward gradient was found throughout the depot, except near the northwest boundary. The southwest corner of the depot in particular has been identified as a probable major recharge area, as a stream flows out of Box Elder Wash, a major recharge canyon, onto the base and infiltrates through high permeability soils in this area. Both the Demolition Pits and the Chemical Range are located within this recharge zone. One other source of recharge has been identified which is of particular interest to this assessment. An estimated 300 acre feet per year of water is recharged to groundwater through infiltration of wastewaters from the industrial waste lagoon and outfall area. This volume of water, along with an estimated 3,000 acre/ft of recharge through direct precipitation on the depot and 8,700 acre/ft of recharge from subsurface flow (combining stream infiltration along nearby valley margins, and underflow from neighboring areas) constitutes the total recharge to the groundwater system underlying TEAD North (JMM, 1987).

Groundwater is discharged to Great Salt Lake or is discharged through evapotranspiration, springs/seeps, or pumping (for water supply). The towns of Grantsville and Erda, each containing a number of domestic wells, are located downgradient of the depot, and the depot itself has five wells used for water supply. A sixth well has reportedly been developed for use, but it is not known whether the well has been utilized for water supply to date. Wells used for the City of Tooele's water supply are reportedly upgradient of the depot (USATHAMA, 1979).

2.3.4 Surface Water Hydrology

There are no perennial streams located within the confines of TEAD North. Several drainages, notably the South Willow and Box Elder Canyon drainages in the southwestern portion of the depot, extend onto the depot. In most instances, however, water in these drainages is either diverted for irrigation or infiltrates local soils near the base of the mountains prior to reaching the depot boundary. Streams on the depot may flow intermittently in response to precipitation. Artificial drainage systems, both surface and subsurface, have been installed at the depot to control runoff during major precipitation events (JMM, 1987).

2.3.5 Climate

The climate in the Tooele Valley area ranges from arid/semi-arid, near Great Salt Lake, to humid, in the mountains surrounding the valley. The climate at the depot is considered semi-arid, with an average precipitation measured in the nearby town of Tooele of 16.95 inches. The average annual temperature at Tooele is 51°F, and varies widely from season to season.

3.0 LOCATION OF SOLID WASTE MANAGEMENT UNITS

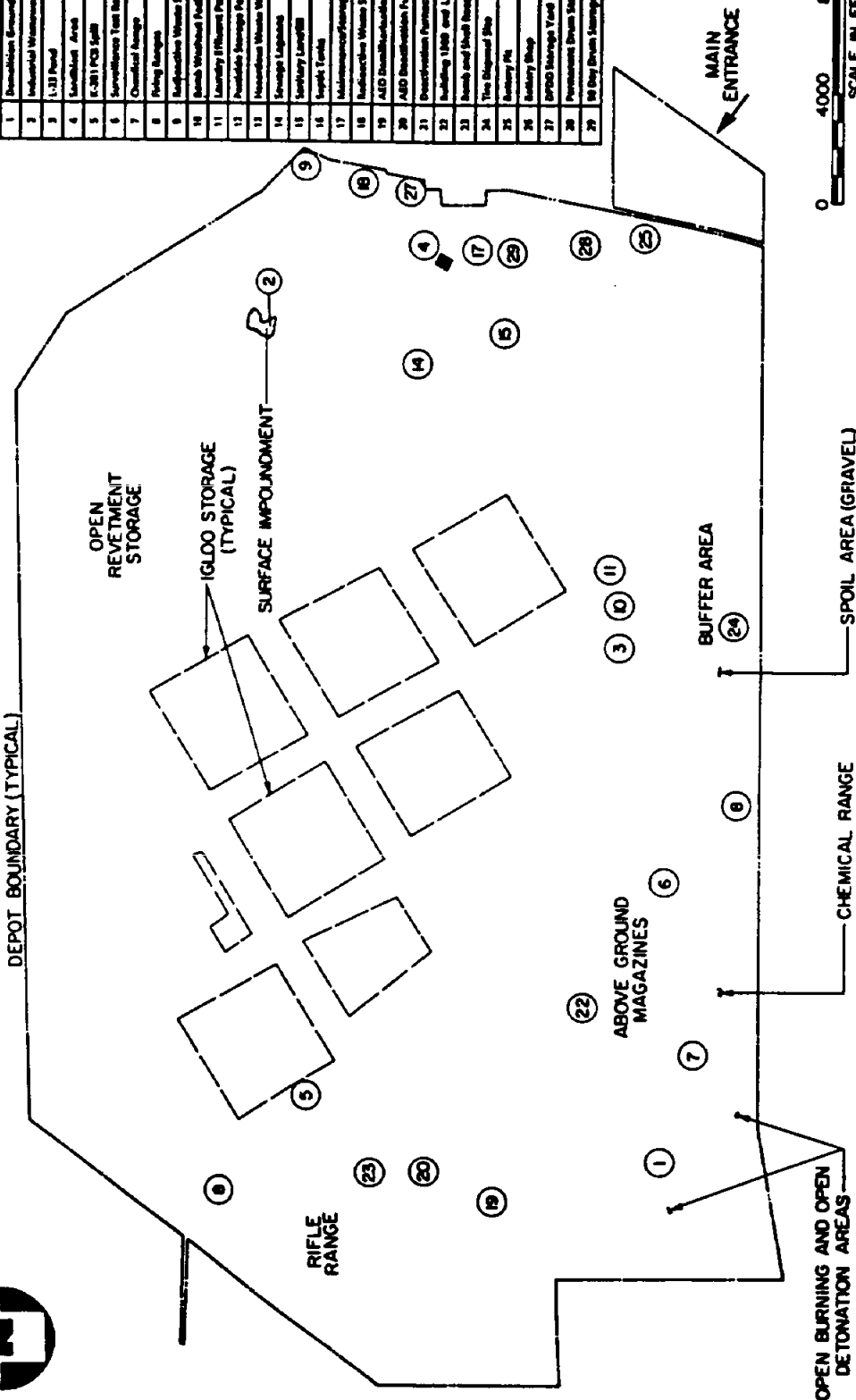
A total of 29 Solid Waste Management Units (SWMU's) have been identified at TEAD North, based on a review of available literature. Table 3-1 lists the identified SWMU's. Figure 3-1 shows the location of the 29 SWMUs at TEAD North.

TABLE 3-1**SOLID WASTE MANAGEMENT UNITS
TEAD NORTH**

No.	SWMU Description
1	Demolition Grounds
2	Industrial Wastewater Lagoon and Outfall Area
3	L-23 Pond
4	Sandblast Area
5	K-281 PCB Spill
6	Surveillance Test Range
7	Chemical Range
8	Firing Ranges
9	Radioactive Waste Storage Area
10	Bomb Washout Facility
11	Laundry Effluent Ponds
12	Pesticide Storage Facility
13	Hazardous Waste Water Storage Tanks
14	Sewage Lagoons
15	Sanitary Landfill
16	Septic Tanks
17	Maintenance/Storage Area
18	Radioactive Waste Storage Building S-659
19	AEO Demilitarization Facility
20	AEO Deactivation Furnace Site
21	Deactivation Furnace, Building 1320
22	Building 1303 and Leaching Pond
23	Bomb and Shell Reconditioning Building
24	Tire Disposal Site
25	Battery Pit
26	Battery Shop
27	DPDO Storage Yard
28	Permanent Drum Storage Area
29	90 Day Drum Storage Area



No.	SWMU Description
1	Demolition Remnants
2	Industrial Wastewater Lagoons and Outfall Area
3	L-13 Pond
4	Landfill Area
5	EC-301 PCB Sill
6	Superfund Test Range
7	Chemical Range
8	Living Ranges
9	Subaqueous Waste Storage Area
10	South Warehouse Facility
11	Laundry Effluent Ponds
12	Pesticide Storage Building
13	Household Waste Storage Tanks
14	Storage Lagoons
15	Sanitary Landfill
16	Septic Tanks
17	Automotive Storage Area
18	Radioactive Waste Storage Building 3-400
19	ASD Demolition Facility
20	ASD Demolition Furnace Site
21	Demolition Furnace, Building 5220
22	Building 1400 and Laundry Pool
23	Shell and Shell Residue Building
24	Two Degraded Sites
25	Sanitary Pit
26	Sanitary Shop
27	DRSD Storage Yard
28	Permanent Drums Storage Area
29	10 Day Drums Storage Area



NOTE: SWMUs 12, 13, 16, 21, 8, 26 ARE NOT SHOWN (LOCATIONS ARE NOT DESCRIBED IN AVAILABLE REFERENCES).

FIGURE 3-1

LOCATION OF SOLID WASTE MANAGEMENT UNITS (SWMUs)
TOOELE ARMY DEPOT SITE (NORTH AREA), TOOELE, UT



4.0 SOLID WASTE MANAGEMENT UNIT RELEASE INFORMATION

Section 4.0 includes a discussion of each Solid Waste Management Unit. The information presented here has been gathered from files supplied to NUS by EPA, the Utah State Division of Environmental Health, and TEAD personnel.

4.1 UNIT NO. 1: DEMOLITION GROUNDS

4.1.1. Description

This unit has been in continuous operation since 1942 and is used for the demolition and open burning of explosives, incendiary-filled munitions, contaminated materials, and riot control agents and munitions (Ecology and Environment, 1985). Conventional munitions ranging in size from small arms munitions to 12,000-pound bombs are detonated in this area. Disposal operations for the explosives, riot control agents, and munitions consist of excavating a 12 to 15-meter deep pit, placing the munitions at the bottom of the excavation, backfilling the pit, and then detonating the munitions. Disposal operations for the white phosphorus-filled incendiary munitions consist of detonation of the device on the ground surface (USATHAMA, 1979). Bulk explosives, explosive-filled munitions, explosive-contaminated materials, smoke pots and grenades, bulk white phosphorus, CS riot-control munitions, dunnage, packing materials, and containers are disposed of by placing the wastes in open pits or trenches, and then igniting the wastes.

4.1.2 Waste Characteristics

Specific information concerning the waste characteristics, amounts, or types of wastes disposed in this unit could not be found in the available literature. However, based on the type of activity at this unit, it can be assumed that the propellant/explosives disposed of include those compounds typically found in munitions used by the Army, as listed in Table 2-2.

4.1.3 Migration Pathways and Evidence of Release

Groundwater

ERTEC unsuccessfully attempted to install a monitoring well at this unit in 1982. The well was drilled to a depth of 245 meters with no groundwater being encountered (Baumann, 1986). As an

alternative to installing and sampling the monitoring well, samples were to have been obtained from two downgradient domestic wells. The wells were to have been sampled sometime after September 1986. Results of this analysis could not be found in the literature. Brad Johnson of the Utah Department of Health indicated that this sampling did not occur (Johnson, 1987).

Based on information provided in the Installation Assessment, 1979, the demolition pits are located within a probable major recharge zone (through stream infiltration) for the main valley aquifer. However, due to the low net precipitation, the depth to groundwater, and the expected trace levels of the probable wastes, the potential for contaminant migration into the aquifer is considered low.

Surface Waters

Potential surface water contamination is not a concern at this unit, since no perennial streams or ponds exist in the vicinity of the unit.

Soils

Sampling of the area has shown explosive and heavy metal contamination of soil (Johnson, 1986). No analytical parameters or sample results were given.

Air

Contaminated surface soil particulates could migrate from this unit via airborne transport. Volatile contamination should not be a problem at this unit, since the wastes disposed are not expected to be volatile or generate significant amounts of gas during degradation.

Subsurface Gas

The wastes disposed are not expected to generate any subsurface gases.

4.2 UNIT NO. 2: INDUSTRIAL WASTEWATER LAGOON AND OUTFALL AREA

4.2.1 Description

Wastewater generated in the industrial maintenance area is discharged into 15,000 feet of unlined ditches (outfall area) and ultimately into the Industrial Waste Lagoon (IWL). The IWL is an unlined evaporation pond, measuring approximately 400 feet by 200 feet, and has been in use since

approximately 1965. Wastewaters generated by the boiler plant, metal parts cleaning, degreasing, steam cleaning operations, and the dynamometer test cells flow into the IWL through the four ditches which make up the outfall area. An average of more than 125,000 gallons of industrial wastewater and storm water are discharged daily into the lagoon (JMM, 1987). The percentages of the total discharge that can be attributed to industrial wastewaters and storm waters are unknown, though, industrial wastewaters undoubtedly constitute the larger percentage of the water discharged.

The major discharges to the IWL and outfall area originate in the following buildings:

- Building 600 - Steam cleaning and metal parts cleaning.
- Building 606 - Boiler plant.
- Building 609 - Steam cleaning and radiator cleaning.
- Building 615 - Metal parts cleaning.
- Building 637 - Degreasing operations, dynamometer cells, steam cleaning/metal parts cleaning, and a boiler plant.
- Building 611 - Steam cleaning and metal parts cleaning.
- Building 620 - Steam cleaning and metal parts cleaning.

The results of a study by USAEHA, 1982, showed that of the 139,800 gallons per day (gpd) of wastewater discharged into the sewer system during the study period, 96 percent, or 134,000 gpd, infiltrated from the ditches and the IWL into the soil, with the remaining 4 percent evaporating (JMM, 1987).

A RCRA Part B Permit application has been prepared for TEAD North that allowed operation of the IWL until November 1983. A groundwater quality assessment (GWQA) was implemented for this unit in 1983 and completed in March 1987. The Army has since entered into a Consent Decree with the Utah Department of Health to close the IWL and associated ditches by November 1, 1989, and to reduce or eliminate discharges to the IWL prior to closure.

4.2.2 Waste Characteristics

Samples of IWL wastewater and sludge were obtained and analyzed by James M. Montgomery, Inc., and the data are summarized in Tables 4-1 through 4-3. As of December 1984, the IWL contained approximately 2,000 cubic yards of sludge and 2,000,000 gallons of liquid. The sludge ranged from about 3 feet thick in the southern end to 1 foot thick in the northern end of the lagoon. The depth of water in the lagoon ranged up to about 8 feet in the deepest portions. Wastewater in the IWL is

alkaline and contains elevated levels of chromium, lead, and organic solvents such as 1,1,1-trichloroethane (TCA), trichloroethene (TCE), toluene, carbon tetrachloride, and other organic compounds (Table 4-1). As displayed in Table 4-3, sludge from the IWL contains organic and inorganic contaminants similar to those found in the wastewaters.

A wide variety of compounds were detected in samples taken from the waste streams in the outfall area associated with the industrial area buildings, including trichloroethene (up to 6,300 ppb), methylene chloride (up to 6,600 ppb), 1,1,1-trichloroethane (up to 30,000 ppb), 1,1-dichloroethene (up to 2,400 ppb), lead (up to 36.7 mg/l), and chromium (up to 22.5 mg/l). It was also estimated that solvent concentrations reached 100-1,000 ppm during large volume discharges to the system (USAEHA, 1982).

4.2.3 Migration Pathways and Evidence of Release

Groundwater

A comprehensive groundwater quality assessment of the IWL was completed by James M. Montgomery, Inc., in 1986. Metals and organic contaminants were found in the groundwater samples taken from the monitoring wells installed and sampled during the study. The TCE plume associated with the unit (most extensive contaminant) occupies an area of approximately 3.3 square miles, and is elongated to the northwest (downgradient). Maximum TCE concentrations are in excess of 200 ug/l. Numerous chlorinated volatile organic compounds were detected above background levels, along with chromium (JMM, 1987).

Surface Waters

No sidewall overflows have been reported at this unit. In addition, there are no streams or ponds in the area into which runoff could migrate. Therefore, potential surface water contamination is not a concern at this unit.

TABLE 4-1

**CHEMICAL ANALYSES OF IWL LIQUID WASTE
TOOELE ARMY DEPOT, NORTH AREA**

Parameter	Source of Analysis		
	USAEHA (1982)		ERTEC (1982)
Date of Sampling	23 Sept. 82	25 Sept. 82	14 Apr. 82
Metals			
Arsenic	<0.01	0.028	0.004
Barium	<0.30	8.91	NA
Beryllium	NA	NA	0.0007
Cadmium	0.046	0.350	0.033
Chromium	0.231	22.5	0.322
Copper	NA	NA	0.062
Lead	1.83	36.7	1.13
Mercury	<0.0002	<0.0002	NA
Nickel	<0.10	0.418	0.008
Selenium	<0.005	<0.005	NA
Silver	<0.025	<0.025	NA
Zinc	NA	NA	0.036
Anions and Cations			
Chloride	NA	NA	20.6
Cyanide	NA	NA	0.031
Nitrate-Nitrogen	NA	NA	3.3
Phosphate	NA	NA	3.7
Sulfate	NA	NA	20.4
Iron	1.0	762	NA
Manganese	<0.03	4.95	NA
Sodium	NA	NA	498

TABLE 4-1
CHEMICAL ANALYSES OF IWL LIQUID WASTE
TOOELE ARMY DEPOT, NORTH AREA
PAGE TWO

Parameter	Source of Analysis		
	USAEHA (1982)		ERTEC (1982)
Date of Sampling	23 Sept. 82	25 Sept. 82	14 Apr. 82
Groundwater Contamination Indicators			
pH	NA	7.12	9.9
Specific Conductivity (μ mhos/cm)	NA	NA	2250
TOC	126	2700	NA
Oil and Grease	82	NA	23
Organics Detected			
1,1,1-Trichloroethane	0.015	NA	0.002
Methylene Chloride	0.030	NA	NA
2,4-Dimethylphenol	NA	NA	2.238
Tetryl (Nitramine)	NA	NA	0.0022
RDX	NA	NA	0.0019

All concentrations in milligrams per liter except pH and as noted.

NA indicates not analyzed.

Source: JMM, 1987

TABLE 4-2

**CHEMICAL ANALYSES OF IWL LIQUID WASTE
DETECTED IN IWL WASTEWATER SAMPLES
TOOELE ARMY DEPOT, NORTH AREA**

Compound	Location in IWL			
	LA-1	LA-2	LA-3	LA-4
Volatile Organics				
Acrolein	<0.02	0.025	0.005	<0.02
Benzene	0.0023	<0.0005	<0.0005	<0.0005
Carbon tetrachloride	0.12	0.084	0.390	0.16
Chlorobenzene	0.001	<0.001	<0.001	0.0023
Dichlorobromomethane	0.0029	<0.001	<0.001	<0.001
1,3-Dichloropropylene	<0.002	<0.002	0.0023	<0.002
Methylene chloride*	0.60	0.60	0.17	2.60
Toluene	0.006	0.009	0.0005	0.008
1,1,1-Trichloroethane	0.27	0.18	0.39	0.37
Trichloroethene	0.0042	0.002	<0.001	0.005
Acetone	0.72	0.0018	0.23	0.54
Polar Organics				
Acrolein	<0.0005	<0.0005	0.016	0.011
Butanol	<0.001	<0.001	0.32	<0.001
Ethanol	0.021	0.012	0.0044	0.033
Ethylbenzene	0.029	0.026	0.0054	<0.001
Semi-Volatile Organics				
2,4-Dimethylphenol	0.30	0.39	0.39	0.096
Phenol	0.30	0.54	<0.001	<0.001
Acenaphthene	<0.0005	<0.0005	0.0007	0.001
Acenaphthylene	<0.0005	<0.0005	<0.0005	0.0002
Anthracene	<0.0005	0.0041	<0.0005	0.0038
Benzo(g,h,i)perylene	<0.001	<0.001	0.0025	<0.001

TABLE 4-2
CHEMICAL ANALYSES OF IWL LIQUID WASTE
DETECTED IN IWL WASTEWATER SAMPLES
TOOELE ARMY DEPOT, NORTH AREA
PAGE TWO

Compound	Location in IWL			
	LA-1	LA-2	LA-3	LA-4
Semi-Volatile Organics (Cont'd)				
Benzo(k)fluoranthene b and /or k	<0.001	<0.001	0.0038	<0.001
Bis(2-ethylhexyl)phthalate	<0.0002	0.0054	0.0035	0.0031
Chrysene	<0.001	<0.001	0.0025	<0.001
Naphthalene	<0.0005	0.0036	0.0041	0.0040
Butoxyethanol	0.55	0.30	>1.0	0.71
Propylcyclohexane	0.025	0.027	0.077	0.056
n-Nonane	0.12	0.094	0.38	0.36
Metals				
Arsenic	0.00568	0.00557	0.00605	0.00589
Barium	<0.025	0.039	<0.025	<0.025
Cadmium	<0.016	0.036	0.028	0.023
Chromium	0.088	0.185	0.141	0.097
Lead	0.298	0.759	0.522	0.371
Mercury	0.0005	<0.0005	<0.0005	<0.0005
Field Measurements				
pH	9.4	9.5	9.6	9.3
Specific Conductance				
@ 25°C (micromhos/cm)	947	779	1022	1120

All concentrations in milligrams per liter (except where noted and pH).

Samples were collected on January 24, and 25, 1985.

See Woodward-Clyde (1986) for sample locations and complete analyses.

* Methylene chloride may be present due to laboratory contamination (Woodward-Clyde, 1986).

Source: JMM, 1987

TABLE 4-3
CONCENTRATION OF PRIORITY POLLUTANTS
DETECTED IN IWL SLUDGE SAMPLES
TOOELE ARMY DEPOT, NORTH AREA

Compound	Location in IWL			
	LA-1	LA-2	LA-3	LA-4
Volatile Organics				
Carbon Tetrachloride	0.03	<0.03	<0.03	<0.03
Methylene Chloride	1.2	3.5	5.9	0.7
Tetrachloroethene	<0.2	0.2	<0.2	<0.2
1,1,1-Trichloroethane	1.3	0.5	0.6	1.3
Semi-Volatile Organics				
2,4-Dimethylphenol	0.7	<0.5	<0.5	<0.5
Anthracene	<0.05	0.6	1.2	1.1
Bis(2-ethylhexyl)phthalate	0.9	5.0	4.2	2.1
Propylcyclohexane (8)	9.4	11	23	4.3
n-Nonane	49	69	14	
Metals				
Arsenic	1.340	0.965	1.070	0.963
Barium	433	603	228	398
Cadmium	85.3	260	53.7	117
Chromium	673	1000	528	1110
Lead	2230	4260	1410	3370
Mercury	0.42	0.81	0.28	0.33

All concentrations in micrograms per gram on a dry weight basis.
For the locations and complete analyses, see Woodward-Clyde Consultants (1986).
Samples were collected on January 24 and 25, 1985.
Source: JMM, 1987

Soils

Soil samples were obtained for chemical analysis from beneath the unlined IWL and the unlined outfall ditches in 1986. The analyses indicated that organic and metals contamination was present (JMM, 1987). This would be expected, considering that most of the wastewater entering the system infiltrates into the soil. Cadmium and chromium contamination of soils to levels exceeding 360 mg/kg have also been reported in a separate source (USATHAMA, 1979).

Air

Volatile organics may be released to the air from this unit.

Subsurface Gas

Subsurface gases may be generated by the volatile wastes infiltrating the soil.

4.3 UNIT NO. 3: L-23 POND

4.3.1 Description

Little information could be found in available reference documents regarding the L-23 Pond. This unit is located near Building B-108 and is used for the disposal of x-ray developing solutions and rinse waters. The pond is approximately 10 feet by 40 feet in area and has a 4-mil thick polyethylene liner (USATHAMA, 1979). Information concerning the capacity of this unit and the chemical composition and quantities of wastes that enter this unit could not be found in the available reference documents.

4.3.2 Waste Characteristics

It is assumed that the wastewaters discharged to this unit consist of developing solutions and related processing solutions and rinses. Silver halides used in the developing process are reportedly precipitated out of the developing solutions prior to discharge to the pond (Johnson, 1986). Samples have been taken from the pond and were found to be nonhazardous (Littlejohn, 1986). However, analytical data for the contents of the pond were not provided in available reference documents.

4.3.3 Migration Pathways and Evidence of Release

Groundwater

A monitoring well was to be installed at this SWMU for the purpose of obtaining groundwater samples during a recent investigation (ERTEC, 1982). However, in the drilling logs and sampling analytical results from that investigation, no information could be found concerning this well.

Overflow or leakage from the unit can potentially reach the water table, with the liquid waste providing a driving force for contaminant transport. There are presently no data to indicate whether groundwater quality has been affected by this unit.

Surface Waters

There are no surface waters near the unit; therefore, surface water contamination is not a concern.

Soils

Infiltration of wastewater through local soils could result in soil contamination, depending on the constituents in the wastewater.

Air/Subsurface

Releases to these media can not be evaluated because data adequately characterizing the volatility or gas-producing nature of the unit wastes are not available.

4.4 UNIT NO. 4: SANDBLAST AREA

4.4.1 Description

Sandblasting of parts and equipment occurs in a maintenance building (Building 615) within the industrial area of TEAD North. Sandblast wastes generated are collected in drums and temporarily stored prior to removal to the 90-day drum storage area. Several vats containing acids, strippers, and solvents are also located in this area. The contents of the vats are periodically dumped down an industrial drain which empties into the IWL and outfall area system (SWMU No. 2) (Hebdon, 1985).

4.4.2 Wastes Generated

Sandblasting wastes are expected to contain metals and paint residues. A listing of the types of acids, strippers, and solvents used in Building 615 is provided in Table 2-1.

4.4.3 Migration Pathways and Evidence of Release

Groundwater/Soils

There are no data in available references concerning releases to groundwater or soils from this unit. Liquid wastes can potentially migrate to the water table via uncontained spills, floor drains, not connected to sewers, and leaks in sewer lines. The potential for releases can not be determined until all waste handling practices and details of building construction are evaluated.

Surface Waters

Surface water contamination is not a concern because there are no surface water bodies in the area.

Air

Particulates may be released to the air during sandblasting and cleanup operations. Volatile emissions may be generated by the liquids used at this unit. Information concerning air pollution control equipment at Building 615 is not available.

Subsurface Gas

Subsurface gas generation is not expected as wastes are handled above ground and any spillage is expected to be minimal.

4.5 UNIT NO. 5: K-281 PCB SPILL

4.5.1 Description

In 1976, as a result of a utility pole fire west of Igloo K281, located in the west-central area of the depot, a transformer was damaged and released its cooling oil (USATHAMA, 1979). No other information is available regarding this unit. The exact location of the spill is unknown.

4.5.2 Waste Characteristics

The chemical characteristics of the transformer cooling oil, including whether the oil contained PCBs, are unknown. Most transformers are filled with a mineral insulating oil refined predominantly from naphthenic crude oils. Additives to inhibit oxidation include 2,6-ditertiary-butyl para-cresol and 2,6-ditertiary-butyl phenol (ASTM, 1981). Approximately 2 percent to 3 percent of liquid-filled transformers are filled with a chlorinated fire-resistant fluid known as askarel. Prior to 1979, transformer askarel contained 60 percent to 100 percent PCBs (USEPA, 1981). Other constituents include trichlorobenzenes and dichlorobenzenes.

4.5.3 Migration Pathways and Evidence of Release

Groundwater

It is unlikely that significant contamination of the groundwater would occur from this spill because of the limited amount of oil typically contained in a transformer and the expected substantial depth (estimated to be greater than 200 feet) to the permanent water table. Additionally, if PCBs are involved, they have a high affinity to bind to soils and are unlikely to migrate to groundwater.

Surface Waters

There are no streams or ponds in the area of this spill. Therefore, the potential for surface water contamination is not a concern.

Soils

The soils in the immediate area of the spill are expected to be contaminated with transformer oil and its constituents.

Air

Transport of contaminated particulates is a potential migration pathway at this unit. However, the source area is probably small, limiting the mass of contaminated particulate available for transport and the volume of ambient air affected.

Subsurface Gas

Volatile compounds are not associated with this spill.

4.6 UNIT NO. 6: SURVEILLANCE TEST RANGE

4.6.1 Description

The Surveillance Test Range, located in the southwestern portion of the depot, has been in continuous use since 1942 for the testing of high-explosive filled munitions, fuses, and propellants (Schmacker, 1985). No other site-specific information could be found in the literature describing this unit.

4.6.2 Waste Characteristics

Specific information concerning the waste characteristics, amounts, or types of wastes disposed of in this unit could not be found in the available literature. However, it can be assumed that scrap metal and explosive/propellant residues have been generated by operations at this unit.

4.6.3 Migration Pathways and Evidence of Release

Groundwater

The potential for groundwater contamination is considered minimal, due to the expected nature and low volume of wastes generated at the area, and the expected substantial depth to groundwater. There are no groundwater quality data available for this unit.

Surface Waters

Surface water contamination is not a concern because there are no surface waters in the area and because of the low volume of wastes expected to be generated at the unit.

Soils

No soil contamination has been documented at this unit to date. Soil contamination is possible, although expected to be minimal. Contaminants expected include metals, propellants, and explosives.

Air

Contaminated surface soil particulates could be entrained and migrate from this unit. Gaseous releases are not a concern at this unit as the wastes disposed of are not expected to generate any gases.

Subsurface Gas

The wastes disposed of are not expected to generate any gases during decomposition.

4.7 UNIT NO. 7: CHEMICAL RANGE

4.7.1 Description

The Chemical Range is located in the southwestern corner of the depot. Chemical and pyrotechnic-type munitions, excluding agent-filled munitions, are tested at this unit. Munitions tested include flares, smoke grenades, smoke pots, white phosphorus-filled grenades and projectiles, incendiary items such as bombs, grenades, pouch and document destroyers, riot control agent-filled munitions, and flame thrower igniters (USATHAMA, 1979).

4.7.2 Waste Characteristics

Residual wastes from the testing of flares, smoke pots, riot control agents, and explosives could be expected at this unit. Waste types most likely present would include burn residue and scrap metal.

4.7.3 Migration Pathways and Evidence of Release

Groundwater

The potential for groundwater contamination is considered low, due to the nature and expected low volume of wastes generated at the area and the expected depth (estimated to be greater than 200 feet) to the permanent water table. No data are available describing groundwater quality near this unit.

Surface Waters

Surface water contamination is not a concern since there are no surface waters in the area and the expected level of soil contamination is low because of the nature and volume of wastes generated.

Soils

Some low level soil contamination is expected to be present as a result of the activities performed at the site.

Air

Contaminated surface soil particulates could be entrained and migrate from this unit.

Subsurface Gas

Subsurface gas releases are not a concern as the wastes are not expected to generate any gases during decomposition.

4.8 UNIT NO. 8: FIRING RANGES

4.8.1 Description

The firing ranges are located along the extreme western and southwestern edges of TEAD North. Small arms ammunition up to .50 caliber have been tested at the ranges since 1942. At present, the National Guard, Army Reserve, Navy, and TEAD military personnel use the ranges for familiarization, qualification, and proficiency firing of small arms.

4.8.2 Waste Characteristics

Small caliber bullets are expected to be scattered throughout the firing ranges.

4.8.3 Migration Pathways and Evidence of Release

Groundwater

The firing ranges are located in a major recharge area for groundwater in Tooele Valley. However, the metal scattered throughout the ranges is essentially immobile, and groundwater contamination is therefore not a concern. No groundwater quality data are available for this unit.

Surface Waters

Surface water contamination is not a concern since no surface waters are located near this unit.

Soils

Soil contamination is not a concern since the wastes present are not readily mobilized and the waste volume is considered low.

Air

Air releases are not expected to be generated by this unit.

Subsurface Gas

Subsurface gases are not expected to be generated by this unit.

4.9 UNIT NO. 9: RADIOACTIVE WASTE STORAGE AREA

4.9.1 Description

The radioactive waste storage area is located in the northeastern corner of the depot, 274 meters northwest of Building S-753 (USATHAMA, 1979). Waste storage/disposal operations are not described in detail in the available literature. Long time employees of TEAD have stated that radioactive wastes may have been dumped in this area in the 1950's (Schmacker, 1985).

4.9.2 Waste Characteristics

Radioactive waste, speedometers, radioactive tubes, watch repair parts, tools, decontamination equipment and materials, cabinets, drawers, and shelves may be stored or disposed at this unit (USATHAMA, 1979).

Isotopes that have been handled at the depot include iridium-192, cobalt-60, nickel-63, carbon-14, polonium-210, cesium-137, hydrogen-3, promethium-147, krypton-85, plutonium-239, and radium-226 (USATHAMA, 1979).

4.9.3 Migration Pathways and Evidence of Release

Groundwater

Minimal natural recharge to groundwater is expected to occur in the area surrounding this unit. As the storage operations and methods are not defined and no groundwater quality data are available for this unit, the impact on groundwater is unknown.

Surface Waters

There are no surface waters nearby to be affected by this unit.

Soils

The potential for soil contamination is unknown because the waste storage/disposal methods are unknown and no soil sampling data are available.

Air

The potential for air releases is unknown because the waste storage/disposal methods are unknown.

Subsurface Gas

The generation of radon or thoron gases is possible if radium or thorium are associated with wastes disposed at this unit.

4.10 UNIT NO. 10: BOMB WASHOUT FACILITY

4.10.1 Description

The bomb washout facility, located in the southern portion of TEAD North, is used to decommission munitions by cutting the bomb casings and removing/recycling the explosives contained within the bomb. Residual explosive materials are removed by washing out the casing. Wastewaters from washout operations are routed through a concrete settling basin to a series of unlined evaporation/infiltration ponds. One series of four ponds, in use from 1948 to 1965, has been closed and capped, and is the subject of a CERCLA investigation. A nearby pond is currently being used to collect wastewaters from the unit (CDM, 1985; Johnson, 1986).

4.10.2 Waste Characteristics

Wastewaters from bomb washout operations contain a variety of explosives and other wastes, including 2,4,6-TNT, RDX, NO_3 , 2,4-DNT, 2,6-DNT, arsenic, and 1,1,1-TCE (Rasch, 1986). Both Composition B and tritonal have reportedly also been handled at this facility (CDM, 1985).

4.10.3 Migration Pathways and Evidence of Release

Groundwater

Groundwater in the vicinity of this unit has already been shown to be affected by the waste disposal operations. Elevated levels of RDX, TNT, and NO_3 have been found in groundwater beneath the evaporation/infiltration ponds (ERTEC, 1982). Wastes migrate to the water table through infiltration of wastewater from the bomb washout operations, and through overflow from the laundry effluent ponds, SWMU No. 11 (located immediately east of the washout ponds), which inundates the evaporation/infiltration ponds.

Surface Waters

Surface water contamination is not a concern since there are no surface waters in the area.

Soils

Soil contaminated with various explosives have been found to depths of 100 feet below the evaporation/infiltration ponds. Wastewater infiltration carries contaminants through soils, resulting in the observed contamination.

Air

Potential releases to the air associated with this unit would consist of wind-blown particulates containing trace levels of explosives. The covered ponds are not a concern at this time, but the pond presently being used may affect air quality during windy days when the pond is dry.

Subsurface Gas

The wastes found at this unit are not expected to generate significant amounts of subsurface gas.

4.11 UNIT NO. 11: LAUNDRY EFFLUENT PONDS

4.11.1 Description

The laundry effluent ponds are located in the southern part of TEAD North, adjacent to the bomb washout ponds. These ponds receive wastewaters from the laundry operations associated with the washout plant. Wastewaters in the ponds evaporate or infiltrate into underlying soils. Periodic overflows from these ponds has been noted, with the overflow inundating the nearby bomb washout facility evaporation/infiltration ponds. Wastewaters were discharged to the effluent ponds at a rate of 7,200 gallons per day in 1985 (CDM, 1985). It is not known whether that rate is typical of present operations.

4.11.2 Waste Characteristics

The laundry effluent contains elevated levels of phosphate, sulfate, sodium, chloride, and presumably trace levels of explosives (CDM, 1985).

4.11.3 Migration Pathways and Evidence of Release

Groundwater

A perched water table has been found beneath the effluent ponds as a result of wastewater infiltration. It is expected that groundwater has been adversely affected by this unit, both through direct infiltration through pond soils and through overflow from the effluent ponds into the nearby bomb washout evaporation/infiltration ponds.

Surface Waters

Surface water contamination is not a concern since there are no surface waters near this unit.

Soils

Infiltration of wastewaters through site soils most likely has affected soils to some degree. No sampling data are available for soils beneath the effluent ponds.

Air

Volatile releases are not a concern as the wastes disposed are not volatile. Particulates may be a concern if trace levels of explosives are present.

Subsurface Gas

This unit is not expected to generate subsurface gases.

4.12 UNIT NO. 12: PESTICIDE STORAGE FACILITY (BUILDING 518)

4.12.1 Description

The pesticide storage facility is located in the eastern part of TEAD North, and is used for the storage of drums containing various pesticides, herbicides, fertilizers, and a variety of miscellaneous products including solvents and paints. The building has a concrete floor and a ventilation fan; however, the floor is to be replaced by a fiberglass floor because of cracking. Drums containing wastes have reportedly been emptied onto the ground at this unit, prior to disposal of the drum (Rasch, 1986).

4.12.2 Waste Characteristics

A variety of herbicides and pesticides, including Hyvarx bromacil, 2,4-D, Malathion, Ficam Powder, Aerosol Pyrethrums, Diazinon, Dursban, Superior Sprayoil, Rodenticide Bait, Chlordane, Grain Bait Gophers, Krovar, and Bromeil are stored or have been stored at the facility. DDT was used in the past, until banned by the government (USATHAMA, 1979). Paints and solvents are also stored at this unit (Rasch, 1986).

4.12.3 Migration Pathways and Evidence of Release

Groundwater

Liquid spills from drums may infiltrate through cracks in the concrete floor to the subsurface, eventually reaching the water table. Past emptying of drums outside the building may result in groundwater contamination. No groundwater quality data are available for this unit.

Surface Waters

Surface water contamination is not a concern because there are no surface waters in the area of this unit.

Soils

Dumping of wastes on the ground or spills leaking through cracks in the flooring would affect soils through direct contact. No soil sampling data are available for this unit.

Air

Leaks or spills from drums may release volatile contaminants to the air. Residual levels of contaminants bound to surface soils may result in airborne particulate contamination when soils are disturbed by wind or through depot activities.

Subsurface Gas

This unit is not expected to generate subsurface gases.

4.13 UNIT NO. 13: HAZARDOUS WASTEWATER STORAGE TANKS

4.13.1 Description

Two steel tanks, each 8-feet high by 55-feet in diameter with a 125,000 gallon capacity, are used to store hazardous wastewater discharges from the vehicle maintenance area. The tanks, located in the eastern part of the depot, are part of the TEAD North wastewater treatment facility. Each tank is cathodically protected, and a berm has been constructed around the tanks. This containment area is lined to hold possible spills (Tateyama, 1986). The liner integrity could not be assessed without a site visit.

4.13.2 Waste Characteristics

No data describing specific waste characteristics were found in the available literature. However, the wastes are expected to be similar in nature to the IWL wastes because of the wastes generated in the vehicle maintenance buildings.

4.13.3 Migration Pathways and Evidence of Release

Groundwater

Spills or leaks from the tanks should be contained by the containment system in place. Therefore, potential groundwater contamination is of little concern.

Surface Waters

Surface water contamination is not a concern since there are no surface waters in the area.

Soils

The containment structure currently in place is presumed to be sufficient to prevent spills from contacting and affecting nearby soils.

Air

Volatile releases may occur if wastewaters spill or leak from the tanks.

Subsurface Gas

Subsurface gas generation is not expected as the containment measures are presumed to be adequate to prevent subsurface waste migration.

4.14 UNIT NO. 14: SEWAGE LAGOONS

4.14.1 Description

The sewage lagoon is located in the eastern part of the depot, adjacent to and west of the industrial area. Domestic wastewaters from housing, warehouse, maintenance, and administrative areas are collected and discharged to two sewage lagoons. The lagoons are connected in series by an overflow pipe. The upper sewage lagoon is primarily used for waste disposal, with the lower lagoon being used occasionally for the overflow from the upper lagoon. Both lagoons are clay-lined. However, waste levels in the upper lagoon often rise above the clay lining, allowing wastewater infiltration through permeable soils (IPEC, 1982). There is evidence of groundwater mounding beneath this unit, indicating that the lagoon liquids recharge groundwater (ERTEC, 1982).

4.14.2 Waste Characteristics

Typical domestic sewage wastes are disposed in the lagoons.

4.14.3 Migration Pathways and Evidence of Release

Groundwater

Sewage lagoon wastewaters can be expected to infiltrate to the water table through underlying soils. Groundwater samples from the area of the lagoons show elevated levels of nickel, nitrates, zinc, chloride, fluoride, sulfate, gross beta, sodium, and trichloroethene (ERTEC, 1982).

Surface Waters

Surface water contamination is not a concern since there are no surface water bodies nearby.

Soils

Infiltration of wastewaters through the clay liner or by lagoon overflow may result in soil contamination. No soil sampling data are available to determine whether local soils have been affected. However, the presence of groundwater contamination implies migration of wastewater through, and contamination of, soils.

Air

There is a potential for releases of volatile constituents and gases produced by biodegradation from this unit. However, their effect on air quality is expected to be minimal. No air sampling data are available to determine whether air is being adversely affected by this unit.

Subsurface Gas

Subsurface gases (volatile constituents and gases produced by biodegradation) may be generated by wastes migrating from the sewage lagoons. However, the affect of any gases is expected to be minimal. No data are available concerning subsurface gas generation at this unit.

4.15 UNIT NO. 15: SANITARY LANDFILL

4.15.1 Description

The sanitary landfill is located south of the warehouse and supply area in the east-central area of the depot. This 115-acre site was opened in 1972, adjacent to the old sewage lagoon. Approximately 14,000 pounds of material are disposed of in this landfill daily (IPEC, 1982). Disposal operations consist of placing the waste material into an excavated trench, then covering the waste with soil. The landfill has been developed over the location of the old sewage lagoon.

4.15.2 Waste Characteristics

In addition to the disposal of municipal wastes, previous disposal practices reportedly included the landfilling of untreated paint sludges, oils, grease, 0.5-liter paper filters containing PCB oils, and heavy metal wastes (Schmacker, 1985). Salts produced from the demilitarization of hydrogen cyanide bombs were also disposed here. This site was used as a sewage lagoon prior to the startup of landfilling activities. Untreated sewage and industrial liquids may be present as a result of past waste disposal in the old sewage lagoon.

4.15.3 Migration Pathways and Evidence of Release

Groundwater

Any liquid wastes disposed at the landfill may have migrated through the soils to the water table, and infiltration of precipitation may carry wastes to the water table. Currently, there are no data in the available literature to indicate whether groundwater contamination has occurred at this unit.

Surface Waters

There are no surface waters in the vicinity of the landfill. Therefore, surface water contamination is not a concern.

Soils

Soils beneath the landfill may be affected by direct contact with the wastes disposed in the landfill or by leachate from the landfill. There are no data available to indicate whether soils are affected.

Air

There are no monitoring data available for this unit. Gases resulting from municipal waste decomposition are possible, but are not considered to be of concern because of the low moisture content and resultant slow decomposition rates.

Subsurface Gas

No subsurface gas releases from this unit have been reported. However methane gas generation is probable. The potential effect of any subsurface gas is judged to be minor because no buildings are located in the immediate vicinity of the landfill.

4.16 UNIT NO. 16: SEPTIC TANKS

4.16.1 Description

At least eleven septic tanks and associated drain fields are located throughout the areas of TEAD North not connected to the domestic sewer system. These tanks collect wastes from the

ammunition storage areas, munition renovation areas, and some guard houses. The wastes are discharged to tile drainfields (USATHAMA, 1979). The exact locations and buildings associated with each septic tank are not described in the available literature. Each of the tanks is sampled on a regular basis to check for hazardous constituents (Schmacker, 1985).

4.16.2 Waste Characteristics

The composition of the disposed wastes is not described in the available literature, although they are assumed to consist primarily of domestic sewage. No contamination has reportedly been found in recent sampling (Schmacker, 1985). However, a list of analytes is not provided.

4.16.3 Migration Pathways and Evidence of Release

Groundwater

Liquid wastes may infiltrate soils underlying the drain fields and affect groundwater. No groundwater sampling data are available for the septic tanks although they have reportedly been sampled.

Surface Waters

Surface water contamination is not a concern since the wastes are disposed of below ground and there are no perennial surface water bodies on the depot.

Soils

Infiltration of liquid wastes through unit soils may result in soil contamination. No soil sampling data are available for this unit.

Air/Subsurface Gas

The generation of methane and other decomposition gases is probable but is not considered to be of concern.

4.17 UNIT NO. 17: MAINTENANCE/STORAGE AREA

4.17.1 Description

This unit is described in one reference as a former storage area for thousands of PCB-containing transformers and was the location of a PCB-oil spill (Baumann, 1986). No description of the unit's location on the depot is given. Other storage areas are located in the eastern part of the depot.

4.17.2 Waste Characteristics

Transformers containing PCBs were stored at this unit and at least one spill has been mentioned in the available literature.

4.17.3 Migration Pathways and Evidence of Release

Groundwater

The likelihood of groundwater contamination caused by this unit is considered low because PCBs are relatively immobile in the subsurface and the spill volumes were not likely to be high.

Surface Waters

Surface water contamination is not a concern since there are no surface waters in the unit area.

Soils

Soil contamination with oil and PCBs has reportedly occurred. No soil sampling results were available for this unit.

Air

Wind-blown soil particulates may contain PCBs.

Subsurface Gas

No subsurface gases are expected to be generated by the wastes spilled stored at this unit.

4.18 UNIT NO. 18: RADIOACTIVE WASTE STORAGE (BUILDING S-659)

4.18.1 Description

Building S-659 is a warehouse, located in the east-central area of the depot, used for the storage of low-level radioactive materials, including radiation detection meters, compasses, sights, rangefinders, and radioactive luminous compounds. The wastes are stored in EPA-approved containers (Schmacker, 1985).

4.18.2 Waste Characteristics

No information is available concerning the specific isotopes that have been stored here, or the levels of radiation that may be present. Isotopes that have been handled at the depot include iridium-192, cobalt-60, nickel-63, carbon-14, polonium-210, cesium-137, hydrogen-3, promethium-147, krypton-85, plutonium-239, and radium-226 (USATHAMA, 1979).

4.18.3 Migration Pathways and Evidence of Release

Groundwater/Surface Waters/Soils

Groundwater, surface water, and soil contamination is not considered to be a concern because the wastes are reportedly stored in approved containers to prevent releases to the environment.

Air

The generation of radon or thoron gases is possible if radium or thorium are associated with wastes stored at this unit. The ability of the waste containers to contain these gases is unknown.

Subsurface Gas

Subsurface gas contamination is not a concern because the wastes are reportedly stored in approved containers above ground.

4.19 UNIT NO. 19: AEO DEMILITARIZATION FACILITY

4.19.1 Description

The AEO Demilitarization Facility is located in the west-central part of the depot. The available literature is contradictory in describing the operations that occurred at this unit. One source (Schmacker, 1985) describes the operations as demilitarization of obsolete military ammunition using robot-controlled, remotely-monitored tools. Another source (USATHAMA, 1979) describes the operations as experimental or pilot-plant-type operations used to determine if a specific demilitarization operation is feasible. In addition, any special equipment necessary for completion of the operation is designed and assembled here.

4.19.2 Waste Characteristics

A variety of explosives and propellants, including TNT, Composition B, and tritonal, has reportedly been handled at this unit.

4.19.3 Migration Pathways and Evidence of Release

Groundwater

The existing literature does not mention the use or disposal of wastewater that would facilitate the transport of contaminants to the water table. According to the available literature, wastes are collected and disposed of either offbase or elsewhere on the depot. Because there is no current evidence of waste releases, groundwater contamination is not a concern.

Surface Waters

There are no surface waters near the unit of evidence and no waste releases. Therefore, surface water contamination is not a concern.

Soils

Because there are apparently no releases from this unit, soil contamination is not a concern.

Air

Air releases are not a concern since no burning/detonation takes place at the unit and the compounds handled are not expected to be volatile.

Subsurface Gas

Subsurface gas generation is not a concern since wastes are not expected to be released to the environment.

4.20 UNIT NO. 20: AEO DEACTIVATION FURNACE SITE

4.20.1 Description

The Deactivation Furnace, Building 1351, and the Flashing Furnace, Building 1356, are part of the Ammunition Equipment Office Furnace Site located in the west-central area of the depot. The Deactivation Furnace is used for the destruction of high explosive-filled projectiles (up to 155-mm), propellants, grenades, boosters, fuses, and bulk explosives. In 1978, several 3.5-inch white phosphorus rockets were burned. Prior to 1978, 500-pound hydrogen cyanide (HCN) filled bombs were disposed of here. The bombs were vented into the furnace, incinerating the HCN. The vented casings were flushed with an alkaline solution to destroy the residual HCN. Salts produced from this process (18.1 kilograms per bomb) were buried in the sanitary landfill (USATHAMA, 1979).

The flashing furnace is used to incinerate any residual explosives left in wash-out munition casings. After the metal components have been sent through the flashing furnace, they are sent to the post disposal office for salvage. Explosives residue and metal oxides obtained from the baghouse filters associated with this unit are taken to the demolition grounds (SWMU No. 1) for disposal by burning (USATHAMA, 1979).

4.20.2 Waste Characteristics

The composition of explosives and propellants is summarized in Table 2-2.

4.20.3 Migration Pathways and Evidence of Release

Groundwater

The wastes disposed of at this unit were burned. Particulates containing metals may have migrated through air emissions to nearby soils prior to the installation of the baghouses. However, these metals are expected to be in an insoluble form, and groundwater is not expected to be affected by precipitation infiltration through nearby soils.

Surface Waters

There are no surface waters near the unit. Therefore, surface water contamination is not a concern.

Soils

Particulates containing metals from air emissions may have settled on nearby soils prior to the installation of baghouses. There are no data concerning soil contamination at this unit.

Air

Air emissions are not a concern at this time as baghouses to collect airborne particulates have been installed.

Subsurface Gas

The unit is not expected to generate any subsurface gases.

4.21 UNIT NO. 21: DEACTIVATION FURNACE, BUILDING 1320

4.21.1 Description

This furnace is used for the destruction of small arms ammunition, primers, and fuses. An auger-type screw pushes ammunition through a rotary kiln, where the ammunition is burned (Hebdon, 1985). Dust from air emissions is collected by a baghouse, is stored in drums, and is currently being handled as a hazardous waste (Johnson, 1986).

4.21.2 Waste Characteristics

Particulates containing low concentrations of metals are expected in the air emissions from this unit. Shell casings and bullets are also left over from deactivation operations.

4.21.3 Migration Pathways and Evidence of Release

Groundwater

The wastes disposed of at this unit were burned. Particulates containing metals may have migrated via air emissions to nearby soils, prior to the installation of the baghouses. However, groundwater is not expected to be impacted by precipitation infiltration through nearby soils because the metals are expected to be in an insoluble form.

Surface Waters

There are no surface waters near this unit. Therefore, surface water contamination is not a concern.

Soils

Particulates from air emissions may have settled out on nearby soils prior to the installation of the baghouse.

Air

Air emissions are not a concern at this time as baghouses to collect airborne particulates have been installed.

Subsurface Gas

The unit is not expected to generate any subsurface gases.

4.22 UNIT No. 22: BUILDING 1303 AND LEACHING POND

4.22.1 Description

Building 1303 was used from 1960 to 1976 to saw high-explosive bombs and projectiles apart to determine the loading characteristics of the filling. Dust from the sawing operations was collected and sent to the Demolition Grounds (SWMU No. 1) for disposal. The building was periodically hosed down and the washdown water was directed to a leaching pond east of the building (USATHAMA, 1979).

4.22.2 Waste Characteristics

Wastes generated at this unit are expected to include explosives, propellants, and metals.

4.22.3 Migration Pathways and Evidence of Release

Groundwater

Washdown water was routed into a leaching pond, where it infiltrated pond soils. Contaminants present in the waters may have been transported to the water table in this manner. No groundwater sampling data are available to determine whether the unit has contaminated groundwater.

Soils

Residual contaminants may have been leached into soils underlying the unit by washdown water infiltration. No soil sampling is mentioned in the available literature.

Surface Waters

Surface water contamination is not a concern since no surface waters are in the area.

Air

Air releases are not expected from this unit because it has been inactive for 11 years.

Subsurface Gas

No subsurface gases are expected to be generated by the wastes disposed at this unit.

4.23 UNIT NO. 23: BOMB AND SHELL RECONDITIONING BUILDING

4.23.1 Description

The Bomb and Shell Reconditioning Building is located in the western portion of the depot. Material from the demilitarization facility and from igloo storage is taken to this location for reprocessing (Schmacker, 1985). Details regarding processing operations are not available.

4.23.2 Waste Characteristics

Waste characteristics are not described in the available literature, but are expected to include various explosives and propellants (See Table 2-2).

4.23.3 Migration Pathways and Evidence of Release

No details are known about waste-handling operations at this unit. Therefore, the migration pathways cannot be defined. The wastes are reportedly handled in accordance with Army and EPA policies (Schmacker, 1985). The potential for releases cannot be defined.

4.24 UNIT NO. 24: TIRE DISPOSAL SITE

4.24.1 Description

Since 1965, unreclaimable tire carcasses have been disposed of in a gravel spoil area near the southern boundary of TEAD North. The tires are dumped in the open, and the accumulated pile is periodically covered with gravel. Approximately 20,000 tires are estimated to be buried at the unit.

4.24.2 Waste Characteristics

The tires are assumed to be primarily rubber, with nylon, steel, cloth, polyester, or other fabrics also used in the tire construction.

4.24.3 Migration Pathways and Evidence of Release

Groundwater/Soil

The potential for soil and groundwater contamination is considered low, due to the nature of the wastes disposed in this unit and the low net recharge to groundwater from precipitation in this area.

Surface Waters

Surface water contamination is not a concern as there are no surface waters in the area.

Air

No air releases are expected from this unit.

Subsurface Gas

No subsurface gas releases are expected from this unit.

4.25 UNIT NO. 25: BATTERY PIT

4.25.1 Description

The battery pit is located in the southeastern corner of the depot near Building 507. This area was used until the early 1960's for the dumping of lead-acid battery waste. The unit has been paved over with asphalt (Schmacker, 1985).

4.25.2 Waste Characteristics

Battery acid and lead are expected to be the primary constituents of the wastes disposed of at the unit.

4.25.3 Migration Pathways and Evidence of Release

Groundwater

Acid from the batteries may leach through underlying soils to the water table. Groundwater pH may be lowered, and lead from the batteries and naturally-occurring metals in the soils may be mobilized and leach into the groundwater. However, the expected alkaline nature of the soils may help minimize or prevent groundwater contamination. No groundwater quality data are available for this unit.

Surface Waters

Surface water contamination is not a concern since no surface waters are in the area.

Soils

Soils may be affected by acid leaching through them and by metals (lead) adsorption since the wastes are in direct contact with soils. No soil sampling data are available for the unit.

Air

Air releases are not a concern because the disposal area is paved over.

Subsurface Gas

Subsurface gases are not expected to be generated by the wastes disposed of at this unit.

4.26 UNIT NO. 26: BATTERY SHOP

4.26.1 Description

Neutralization of battery acid takes place at the battery shop which is located within the industrial area in the eastern part of TEAD North. Neutralization operations consist of mixing battery acid wastes in a large ceramic tank with either sodium bicarbonate or sodium hydroxide, until the pH is raised to an acceptable level. Once neutralized, the wastes are discharged into an industrial drain, presumably connected to the IWL system.

4.26.2 Waste Characteristic

Battery acid, sodium bicarbonate, and sodium hydroxide are handled at this unit.

4.26.3 Migration Pathways and Evidence of Release

Groundwater

Releases to groundwater are presumably not a concern because the wastes are reportedly handled in a tank inside a building.

Surface Waters

Surface water contamination is not a concern since there are no surface waters nearby and the wastes are contained until discharged to the IWL system.

Soils

Soil contamination is not a concern since the wastes are contained within the battery shop until released to the IWL system.

Air

The wastes handled at this unit are not expected to generate any air releases of concern.

Subsurface Gas

No mechanism exists for wastes to reach the subsurface. Gases are not expected to be generated by wastes at this unit.

4.27 UNIT NO. 27: DPDO STORAGE YARDS

4.27.1 Description

The Defense Property Disposal Office (DPDO) operates two storage yards in the eastern part of the depot. Materials to be recycled are packed and stored in these yards until disposed of, either through sales or relocation to disposal sites on the depot.

4.27.2 Waste Characteristics

A variety of salvageable wastes, primarily metal wastes, are stored in the yards. Some drums containing potentially hazardous wastes were observed at this unit (Hebdon, 1985).

4.27.3 Migration Pathways and Evidence of Release

Groundwater

Spills of liquid wastes or precipitation infiltration may carry wastes to the water table. Groundwater contamination potential can not be fully evaluated until the nature and extent of spills and resulting soil contamination, if any, are determined.

Surface Waters

Surface water contamination is not a concern since there are no surface waters in the area.

Soils/Subsurface Gas

Spills of liquid wastes or runoff from the storage areas may carry wastes to soils. The potential for soil contamination and generation of subsurface gas can not be determined until detailed information concerning types, quantities, and methods of storage of wastes material are evaluated.

Air

Airborne transport of contaminated particulates is possible if contaminated soils are present. No data concerning soil contamination are available.

4.28 UNIT NO. 28: PERMANENT DRUM STORAGE AREA

4.28.1 Description

The permanent drum storage area is located in the eastern part of the depot and is used for the storage of 55-gallon drums containing a variety of wastes. Details of the construction of the storage area were not available during the preparation of this RFA. Over 500 drums are reportedly stored at the unit. At least three ruptured drums were noted during a recent inspection (Johnson, 1986).

4.28.2 Waste Characteristics

Details regarding the waste types stored at this unit are not contained in the references provided.

4.28.3 Migration Pathways and Evidence of Release

Groundwater

Leaks from drums may infiltrate site soils to groundwater, if the storage area is not properly constructed and maintained. Groundwater quality data for this unit are not available.

Surface Waters

Surface water contamination is not a concern since no surface waters are in the area.

Soils

Spills from drums may migrate to local soils if not properly contained. No soil sampling data are available for the unit.

Air

Volatile compounds may be released to the air following a spill. No descriptions of any such releases are contained in the available literature.

Subsurface Gas

Spills of volatile compounds could potentially introduce volatiles to subsurface soils. However, sufficient quantities of waste are not expected to be released to generate significant quantities of subsurface gas.

4.29 UNIT NO. 29: 90-DAY DRUM STORAGE AREA

4.29.1 Description

The 90-day drum storage area is located in the eastern part of the depot adjacent to the maintenance shops, and is used for the temporary storage of drums containing a variety of wastes. Over 200 drums were stored there during a recent inspection (Johnson, 1986). A number of drums had been there longer than the 90-day limit. Spillage of wastes and damaged drums were observed during a recent inspection (Hebdon, 1985).

4.29.2 Waste Characteristics

Drums containing a variety of wastes, including 1,1,1-trichloroethane, polyurethane, lacquer thinner, sodium hydroxide, paint sludges, paint dust, steel dust, walnut dust, and F-type stripper have been stored at the unit.

4.29.3 Migration Pathways and Evidence of Release

Groundwater

Leaks from drums may infiltrate site soils to groundwater, if the storage area is not properly constructed and maintained. Groundwater quality data for this unit are not available.

Surface Waters

Surface water contamination is not a concern since there are no surface waters in the area.

Soils

Spills from drums may migrate to local soils, if not properly contained. No soil sampling data are available for the unit.

Air

Volatile compounds may be released to the air following a spill. No descriptions of any such releases are contained in the available literature.

Subsurface Gas

Sufficient quantities of wastes are not expected to be released to generate significant quantities of subsurface gases.

4.30 SUMMARY

The SWMUs described in this section were identified and characterized using data obtained from State and EPA files, with some supplemental information supplied by the depot. A site visit, which is typically performed to verify SWMU characteristics and identify other possible SWMUs not described in the files, was not conducted for Tooele North, at EPA request. Based on RCRA facility assessments performed at similar installations, there may be a number of SWMUs at the depot not identified to date. Examples of SWMUs that may be present but are not identified include the following:

- Waste oil tanks
- Oil-water separators
- Sumps
- Solvent distillation units
- Waste solvent tanks or drum storage areas
- Wastewater pretreatment units
 - pretreatment for metals removal for X-ray solutions discharged to L-23 Pond (SWMU No. 3).

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF RELEASE INFORMATION

Past studies performed at TEAD North have revealed the existence of extensive soil and groundwater contamination in two main areas; the industrial waste lagoon and outfall area, and the bomb washout facility. These two areas have been the primary subjects of most of the environmental studies performed at the depot.

Data with which to determine whether other identified SWMUs are releasing hazardous wastes or hazardous constituents (or have in the past) is lacking. Some soil contamination has been reported at the demolition grounds. The sewage lagoons have affected groundwater to an unknown extent.

5.2 RECOMMENDATIONS

Following are recommendations concerning the need for further action each SWMU at TEAD North. Recommendations available to the investigator under the RFA process include the following:

1. No further action
2. Conduct a sampling investigation (SI)
3. Skip the SI and proceed directly to a remedial investigation
4. Begin planning and implementing corrective measures
5. Refer unit to other environmental program offices for further assessment

Consideration of recommendation for surface soil sampling assumes that exposure by onsite personnel to airborne particulates from contaminated surface soils is not addressed under this program. This pathway is of concern only for offsite residents. Recommendations for each SWMU are summarized in Table 5-1.

5.2.1 Unit No. 1: Demolition Grounds

Even though the potential for groundwater contamination is considered to be low, a groundwater sampling investigation is proposed for this unit because of the large area affected by demolition activities, the confirmed presence of soil contamination, and the location of this unit in a major groundwater recharge area.

5.2.2 Unit No. 2: Industrial Wastewater Lagoon and Outfall Area

Extensive groundwater and soil contamination has occurred as a result of waste disposal operations at this unit. Because this unit is currently the subject of a RCRA closure investigation, recommendations for further action are deferred to the EPA and State RCRA programs.

5.2.3 Unit No. 3: L-23 Pond

There is a potential for releases to soils and groundwater associated with this unit. A sampling investigation is recommended to determine whether the unit has affected groundwater.

5.2.4 Unit No. 4: Sandblast Area

The potential for releases from this unit is considered low. No further action is recommended at this time pending a thorough evaluation of waste handling practices and inspection of the unit.

5.2.5 Unit No. 5: K-281 PCB Spill

There is a potential for soil and possibly particulate air contamination associated with this unit. An effort should be made to locate the spill, and a sampling investigation is recommended to sample surface soils for PCBs, dichlorobenzenes, and trichlorobenzenes.

5.2.6 Unit No. 6: Surveillance Test Range

The potential for significant releases from this unit is considered low. No further action is recommended at this time.

5.2.7 Unit No. 7: Chemical Range

The potential for significant releases from this unit is considered low. No further action is recommended at this time.

5.2.8 Unit No. 8: Firing Ranges

The potential for significant releases from this unit is considered low. No further action is recommended at this time.

5.2.9 Unit No. 9: Radioactive Waste Storage Area

Little is known about waste volumes and waste handling operations at this unit. It is recommended that more data be gathered regarding this unit and a sampling investigation be conducted, to determine whether or not radioactive wastes are present.

5.2.10 Unit No. 10: Bomb Washout Facility

Studies performed at this unit have documented the existence of widespread soil and groundwater contamination associated with the evaporation/infiltration ponds. Because the unit is currently the subject of a CERCLA investigation, recommendations for further action are deferred to the EPA and State programs overseeing the investigation.

5.2.11 Unit No. 11: Laundry Effluent Ponds

Soil and groundwater contamination can be attributed to this unit. The major affect of the unit, however, may be the periodic overflow from this unit inundating the nearby bomb washout facility evaporation/infiltration ponds and transporting washout wastes to the water table through infiltration through site soils. Corrective measures are recommended here to prevent further overflows from the unit, followed by a remedial investigation to determine the affect of the effluent ponds on soils and groundwater.

5.2.12 Unit No. 12: Pesticide Storage Facility (Building 518)

The main concern regarding environmental impacts at this unit centers on the past practice of dumping drummed wastes on the ground outside the unit. A sampling investigation is recommended to determine whether soils have been contaminated. Soils should be sampled for pesticides/herbicides. The need to sample and analyze groundwater should be assessed after soil data are evaluated.

5.2.13 Unit No. 13: Hazardous Wastewater Storage Tanks

There is no mention in the files of any release from this unit, and containment structures if properly designed, constructed, and maintained, should be adequate to prevent releases in the event of a spill. No further action is recommended at this time pending inspection of the unit and a thorough analysis of waste-handling practices.

5.2.14 Unit No. 14: Sewage Lagoons

Groundwater sampling at this unit has revealed elevated levels of nickel, nitrates, zinc, chloride, fluoride, sulfate, gross beta, sodium, and trichloroethene. A remedial investigation structured to determine the extent of groundwater and soil contamination is recommended.

5.2.15 Unit No. 15: Sanitary Landfill

There is a significant potential for groundwater contamination associated with this unit because of past waste disposal practices. A sampling investigation is recommended to determine whether groundwater has been affected.

5.2.16 Unit No. 16 : Septic Tanks

The potential for soil and groundwater contamination with hazardous constituents is regarded as low for this unit. No action beyond the ongoing periodic sampling is recommended. The sampling parameters for each septic tank should be reviewed to ensure that the analytes are appropriate for the activities associated with the buildings serviced by the septic tanks.

5.2.17 Unit No. 17: Maintenance/Storage Area

Available literature mentions a spill of PCB oil occurring at this unit. A sampling investigation is recommended to determine whether PCB-contaminated soils exist at the site. Analyses should also include dichlorobenzenes and trichlorobenzenes.

5.2.18 Unit No. 18: Radioactive Waste Storage (Building S-659)

No further action is recommended at this unit since no spills are documented and the wastes are reportedly handled in an EPA-approved manner.

5.2.19 Unit No. 19: AEO Demilitarization Facility

No action is recommended at this unit as the potential for releases to the environment is regarded as low and there is no record of any problems associated with the unit.

5.2.20 Unit No. 20: AEO Deactivation Furnace Site

If this unit operated without air pollution equipment for any length of time, the potential exists for deposition for metal-contaminated particulates on surrounding soils. Information concerning the date the existing baghouse was installed is needed to evaluate the potential for soil contamination. If this potential is confirmed, soil sampling around the unit is recommended to define the extent of contaminated soil.

5.2.21 Unit No. 21: Deactivation Furnace, Building 1320

If this unit operated without air pollution equipment for any length of time, the potential exists for deposition for metal-contaminated particulates on surrounding soils. Information concerning the date the existing baghouse was installed is needed to evaluate the potential for soil contamination. If this potential is confirmed, soil sampling around the unit is recommended to define the extent of contaminated soil.

5.2.22 Unit No. 22: Building 1303 and Leaching Pond

There appears to be a significant potential for soil and groundwater contamination because of waste handling operations at this unit. A sampling investigation is recommended to evaluate soil and groundwater quality in the area of the leaching pond.

5.2.23 Unit No. 23: Bomb and Shell Reconditioning Building

Specifics regarding waste handling practices are not described in the available literature. However, the potential for releases is considered low since the wastes are reportedly handled in accordance with Army and EPA policies. No further action is recommended at this time pending inspection of the unit and review of waste-handling practices.

5.2.24 Unit No. 24: Tire Disposal Site

No further action is recommended for this unit at this time because no known hazardous wastes are disposed at this unit and the release of hazardous constituents is considered unlikely.

5.2.25 Unit No. 25: Battery Pit

Acid wastes and lead have been dumped at this unit. Soils should be sampled and analyzed for pH and metals to determine the extent of waste migration/mobilization in subsurface soils. The need for groundwater monitoring should be based on analysis of soil sampling data.

5.2.26 Unit No. 26: Battery Shop

No further action is recommended at this unit since the current waste-handling practices within the shop appear to be adequate, pending inspection of the unit.

5.2.27 Unit No. 27: DPDO Storage Yards

Additional information concerning the types of wastes handled at this unit and the methods of wastes handling and storage is needed to evaluate the potential for spills. If no additional information is available, a limited surface soil sampling program is recommended.

5.2.28 Unit No. 28: Permanent Drum Storage Area

This unit is periodically inspected by state officials. Since no documentation of releases from this unit has been found, no further action beyond the ongoing inspections is recommended.

5.2.29 Unit No. 29: 90-Day Drum Storage Area

This unit is periodically inspected by state officials. Since no documentation of releases from this unit has been found, no further action beyond the ongoing inspections is recommended.